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ABSTRACT

This joint congressional committee hearing focuses on attaining the educational goal of making the United States children first in mathematics and science by the year 2000 as proposed by the President's "America 2000" plan. Witnesses representing the Office of Science and Technology Policy, the National Aeronautics and Space Administration, the National Science Foundation, and the Department of Education were received. Testimony addressed the roles played by government agencies in coordinating interagency efforts to achieve the national goals for mathematics and science education and gave examples of activities engaged in by the above mentioned agencies in order to reach those goals. Complete texts of the witness' testimony and other speakers is included. (MDH)

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SCIENCE, MATHEMATICS, AND ENGINEERING EDUCATION

ED 361 179

JOINT HEARING

BEFORE THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

AND THE

COMMITTEE ON EDUCATION AND LABOR U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED SECOND CONGRESS

SECOND SESSION

FEBRUARY 27, 1992

[No. 118]

(Committee on Science, Space, and Technology)

Serial No. 102-94

(Committee on Education and Labor)

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SCIENCE, MATHEMATICS, AND ENGINEERING EDUCATION

THURSDAY, FEBRUARY 27, 1992

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
AND THE COMMITTEE ON EDUCATION AND LABOR,
Washington, DC.

The Committees met in joint session, pursuant to call, at 9:38 a.m., in Room 2175, Rayburn House Office Building, Hon. William D. Ford [Chairman, Committee on Education and Labor] and Hon. George E. Brown [Chairman, Committee on Science, Space, and Technology] presiding.

Members Present: Representatives Ford; Kildee; Roemer; Hayes; Andrews; Sawyer; Goodling; Boucher; Perkins; Olver; Swett; Wolpe; Lloyd; Cramer; Geren; Valentine; Browder; Fawell; Gunderson; Henry; Morella; Ritter; Boehlert; Walker; Gilchrest; Packard; Rohrabacher; Sensenbrenner; Zimmer.

Staff Present: John F. Jennings, General Counsel for Education; Andy Hartman, Education Coordinator; Lynn Selmser, Professional Staff Member; Grace Ostenso, Staff Director, Subcommittee on Science; Shana Dale, Republican Counsel, Subcommittee on Science.

Chairman FORD. Today the Committee on Education and Labor and the Committee on Science, Space, and Technology are conducting a joint hearing on mathematics and science education with the heads of the three Federal agencies with principal responsibility in this area and with the President's Chief Science Advisor.

I would like to commend the White House, the Department of Education, the National Science Foundation and the National Aeronautics and Space Administration for making a great effort to better coordinate the Federal Government's assistance to students and schools in the areas of science and math. You have performed a noteworthy feat and you are to be highly commended for that.

I don't mean to detract from that, however, by observing that I do have a serious question about whether these efforts are bold enough to have American schoolchildren first in science and math by the year 2000. This Committee is acting on legislation to adopt that as one of the President's goals and the goal will mean nothing if we are to proceed at the present rate. This year we're looking at an increase in the President's budget of 7 percent for these activities, and I know the increase is greater than that if you consider the last several years, but incrementally, it's not very much of a bold commitment to reach that goal by the year 2000.

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Another report came out two weeks ago, again showing American students at the bottom of the list in terms of their math and science achievements as compared to children of other nations. We only have eight years to go to the turn of the century, and how are we going to get our students from last to first in eight years if we don't really work together and make a serious effort to do more than we have been doing in the past.

Chairman Brown and I have discussed expediting the hearings today and we are requesting that only the two Chairmen and the ranking Republican members make opening statements, that all other opening statements be inserted in the record. If there is no objection from the Members, that's the way we will proceed.

Mr. FAWELL. Mr. Chairman?

Chairman FORD. Yes.

Mr. FAWELL. I would like to submit for the record a paper by Dr. Leon Lederman, Professor of Physics and Cochair of the Chicago Teachers Academy for Mathematics and Science in Chicago. Dr. Lederman presents a set of legislative criterion for a Federal program of teachers academies across the country.

I am sorry that I have to leave early but if I may submit this to the record, I would appreciate it.

Chairman FORD. Without objection, that will be submitted, contemporaneous with your statement, if you want to put one in the record.

Mr. FAWELL. Thank you.

Chairman FORD. Mr. Brown—Chairman Brown.

Chairman BROWN. Thank you, Chairman Ford. In accordance with your statement, I will be relatively brief.

It is a pleasure to be here with you and to demonstrate our joint commitment and interest in improving the quality of education, in specifically math and science and engineering education. We all know the problems that exist in this field and I think we all have a commitment to overcome them. The question is, do we have a plan, can we evaluate that plan, can we assess the progress that we're making.

These terms flow lightly from the tongue, but actually, as long as I've been in Congress, I have tried to put emphasis on how we can plan our programs better and how we can determine, through assessment procedures and evaluation procedures, if we're meeting our objectives. That has to underlie everything that we do. I don't really think we'll meet our goals as well as we would like by the year 2000, but we need to continue the commitment and we need to be able to measure how much progress we're making, or whether we're going backwards—which we have, apparently, over the past several years in some areas. So I would like to urge that on all of you as you proceed with this initiative, which we all want to give our maximum support to.

I thank you very much for all being here this morning.

[The prepared opening statement of Hon. George E. Brown follows:]

OPENING STATEMENT
OF THE
HONORABLE GEORGE E. BROWN, Jr. (D-CA)
CHAIRMAN
SCIENCE, SPACE, AND TECHNOLOGY COMMITTEE
ON
SCIENCE, MATHEMATICS, AND
ENGINEERING EDUCATION
JOINT HEARING WITH THE
EDUCATION AND LABOR COMMITTEE

February 27, 1992

I am pleased to join with Chairman Ford and our colleagues on the Education and Labor Committee for this joint hearing on science, mathematics, and engineering education. The hearing is a continuation of the efforts of our two committees to strengthen the role of the Federal Government in science, mathematics, and engineering education. In 1990, the two committees brought before the House the Excellence in Mathematics, Science and Engineering Education Act of 1990 which became public law (P.L. 101-589) in November, 1990. The law authorized science, mathematics, and engineering education programs for the National Science Foundation, the Department of Education, and the Department of Energy

including scholarships, graduate fellowships and traineeships, and informal science education. The law also required the Director of the Office of Science and Technology Policy to prepare a report containing a strategic plan and a system for evaluating the effectiveness of a federal interagency program to enhance science, mathematics, and engineering education.

The first report, By the Year 2000: First in the World, was prepared by the Committee on Education and Human Resources of the Office of Science and Technology Policy and submitted to the Congress in February, 1991. As the title of the report indicates, the major objective of the initiative is to achieve the National Education Goal that by the year 2000, "U.S. students will be first in the world in science and mathematics achievement". The report was updated in February, 1992 and includes $2.1 billion in Fiscal Year 1993 for an initiative in science, mathematics, and engineering education at the pre-college through post-doctoral levels and for public science literacy programs. Our hearing today will focus on the precollege

and undergraduate components which comprise about 75 percent of the Fiscal Year 1993 budget request for the initiative.

On February 5, the Educational Testing Service released the results of a study to assess student performance in science and mathematics in 20 countries. There were few surprises -- in almost every category students in the United States ranked among the lowest of all those taking the test, including lower than students from Korea, Israel, Spain, Hungry, Slovenia, and the former Soviet Union. The lack of surprise can be related to the fact that the state of science and mathematics education has been a national concern since the early 1980's. For example, a 1983 report by the Department of Education, entitled A Nation at Risk, indicated that "the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and as a people." This report has been followed by literally hundreds of others confirming the extent of scientific and technical illiteracy in the

United States and stressing the urgency to reform the Nation's schools, especially K-12 science and mathematics education. A successful reform could make a significant contribution to the quality of life of all our citizens, both now and in the future, as they prepare to make informed decisions on scientific and technical issues confronting themselves and the Nation.

As the recent report of the Carnegie Commission on Science, Technology, and Government, entitled In the National Interest: The Federal Government in the Reform of K-12 Math and Science Education, points out -- "There is no shortage of motivated Americans with good ideas about how to serve our children better. In short supply, however, is the institutional capacity to aggregate enough resources, to build a national consensus for action, and -most important- to persist with a specific program of reform long enough for it to take effect, at least a decade and maybe two." Thus, I congratulate Dr. Bromley and the Federal Coordinating Council for Science, Engineering, and Technology for undertaking this

initiative. I assume the initiative will continue at least through the year 2000 to provide adequate time to take effect, and to be evaluated and revised as necessary to achieve the National Education Goals related to science and mathematics education.

In that regard, I am disappointed that the initiative is beginning its second year without a multi-year interagency strategic plan in place or a system for assessing the effectiveness of the various components of the initiative as called for by P.L. 101-589, the Excellence in Mathematics, Science and Engineering Act of 1990. Although the report of the Committee on Education and Human Resources for Fiscal Year 1993 indicates such a strategic plan will be a part of their future activities, no mention is made of evaluation procedures to assess the outcomes of the programs being implemented. How will we know if our students are on track to be the first in the world in science and mathematics by the year 2000?

I look forward to the testimony of our distinguished witnesses today and their views on the role of the Federal Government in K-12 science, mathematics, and engineering educational standards, reform, and achievement.

Chairman FORD. Thank you, Mr. Chairman.

Mr. Goodling.

Mr. GOODLING. Thank you, Mr. Chairman. I'm pleased to be with this illustrious panel today and looking forward to their testimony.

I find it encouraging that various agreements have been made to coordinate efforts in the area at the Federal level. As you know, one of the concerns I've had in the past is the number of programs addressing math and science education which have been enacted by different committees in Congress, with administration through various governmental departments—or as I normally say, since education has become sexy, everybody wants to get involved in it, and I'm not sure the left hand will know where the right hand is going. My fear has been that we will waste valuable education dollars on the duplication of effort rather than achieving the best possible math and science programs through coordination. I am hopeful what I hear today will allay my fears, and I look forward to receiving your testimony.

I am reminded this morning, as I remind myself every day, that not much is going to happen to change education unless we find some way to help the elementary teacher, who's had very little training in the teaching of mathematics. She probably has had very few math courses, oftentimes in high school, and probably none in college. But, somehow or other we expect her to turn youngsters on to math by the time they get in sixth grade. It doesn't work that way. I've been around education too long. So I look forward to your testimony.

Chairman FORD. Mr. Walker, the ranking Member of the Science Committee.

Mr. WALKER. Thank you, Mr. Chairman.

This hearing is a recognition, I think, that the United States faces a grave challenge in the field of mathematics and science education. Today, more than half of all postgraduate students in America—in the areas of mathematics, science and engineering are non-Native born Americans. We can take pride in the fact that our colleges and universities are viewed worldwide as the finest, but we must be concerned that the number of American students is at an all-time low.

In a global marketplace, where science and technology are the driving force in the world economy, we face the prospect of becoming a noncompetitive nation if we do not reverse this downward trend.

I am an educator by training. I firmly believe that this problem is one that must be addressed at all levels. First, we must get the attention of our children at the earliest elementary years and convince them that science and mathematics are fun and challenging. We must make math and science interesting at all levels and provide plenty of opportunity for hands-on experience. And we must challenge our children to a lifetime of achievement.

Mr. Chairman, I have some other remarks here. What I would like to do is submit those for the record.

Chairman FORD. Without objection, it is agreed to without objection. The prepared statements of all the Members will be submitted at this point in the record.

[The prepared opening statements of Mr. Walker, Mr. Fawell, Mr. Costello, Mr. Boucher, Mr. Payne, Mr. Valentine, Mr. Packard, Mrs. Morella, Mr. Rohrabacher, Mr. Swett, and Mr. Sawyer follow:]

OPENING STATEMENT
REP. HARRIS W. FAWELL
HOUSE SCIENCE, SPACE AND TECHNOLOGY COMMITTEE

MR. CHAIRMAN, I THANK YOU FOR CONVENING THIS HEARING TODAY ON MATH AND SCIENCE EDUCATION, AN ISSUE WHICH VITALLY AFFECTS OUR NATION'S FUTURE GROWTH AND INTERNATIONAL COMPETITIVENESS.

THE PRESIDENT'S "AMERICA 2000" PLAN HAS CALLED FOR THE NUMBER OF TEACHERS WITH A SUBSTANTIVE BACKGROUND IN MATHEMATICS AND SCIENCE TO INCREASE BY 50%.

I HAVE LONG FELT THAT IMPROVED TEACHER TRAINING WOULD HAVE AN IMMEDIATE IMPACT ON THE QUALITY OF SCIENCE EDUCATION, AND I HAVE BEEN WORKING WITH MY SCIENCE ADVISORY COMMITTEE IN ILLINOIS AND WITH LOCAL TEACHERS IN THE AREA TO IDENTIFY WAYS TO IMPLEMENT THIS GOAL.

I AM PLEASED TO REPORT THAT IN ITS FISCAL YEAR 1993 BUDGET, THE NATIONAL SCIENCE FOUNDATION HAS INCLUDED A PROGRAM I ADVOCATED WHICH ALLOWS TEACHERS TO EARN MASTERS OF SCIENCE IN TEACHING DEGREES DURING THE SUMMER. I CONGRATULATE WALTER MASSEY ON HIS LEADERSHIP IN THIS AREA.

I WOULD ALSO LIKE TO SUBMIT FOR THE RECORD A PAPER BY DR. LEON LEDERMAN, PROFESSOR OF PHYSICS AND CO-CHAIR OF THE CHICAGO TEACHERS ACADEMY FOR MATHEMATICS AND SCIENCE IN CHICAGO. DR. LEDERMAN PRESENTS A SET OF LEGISLATIVE CRITERION FOR A FEDERAL PROGRAM OF TEACHERS' ACADEMIES ACROSS THE COUNTRY. I INVITE THE COMMITTEE MEMBERS TO REVIEW

HIS SUGGESTIONS. CERTAINLY THIS IS AN AREA OF REFORM WHICH NEEDS THE ENTHUSIASM AND VISION OF SOMEONE LIKE LEON LEDERMAN.

THANK YOU ONCE AGAIN, MR. CHAIRMAN. I LOOK FORWARD TO THE TESTIMONY WE WILL HEAR TODAY.

THE UNIVERSITY OF CHICAGO
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THE ENRICO FERMI INSTITUTE
5640 ELLIS AVENUE

February 26, 1992

To: Congressman Harris W. Fawell
13th District, Illinois

From: Leon M. Lederman
Professor of Physics and
Co-chair, Teachers Academy for
Mathematics and Science, Chicago

Re: Points to be Made in Education Hearing
Thursday, February 26, 1992

In spite of vastly increased expenditures on educational research, curriculum reform, pilot programs and wide-spread state and local initiatives, the 300 billion dollar pre-college program has not moved much towards the Presidents' goals.

- The Chicago plan is one of marshalling local resources: Universities, Research Labs, Business Management, Museums and the schools to achieve one of the crucial goals--a more competent, motivated and professional teachers corps. A not-for-profit academy structure, outside of the state and city systems, is most effective.

- This is particularly effective in the large, urban environments where we fail most dramatically.

- Federal funds have a maximum leveraging effect in this context. Corporate managers, University Presidents, Senior Scientists, etc. are volunteers in this war and are obligated to perform.

- The plan uses the very best and brightest, in part, in each city (or large rural area) and this bypasses the Federal, State and City school bureaucracy where, to a large extent, the nation was put "at risk".

- This is a huge scale action plan which could have a major impact on over 50,000 teachers per year where our society needs them most.

Leon M. Lederman
University of Chicago
February 26, 1992

Legislative Ingredients for Urban and Rural Teachers' Academy

The Chicago Teachers' Academy for Mathematics and Science can serve as a model for intervention in urban schools around the nation. It also provides guidance for analogous intervention in poor rural areas. Below we list the ingredients of the Chicago plan with the objective of institutionalizing the program and insulating it from the variable enthusiasms of changing cabinet officers and federal agency heads.

We hew to the philosophical line that there is no ideal intervention and that true changes will evolve "out there" and that the role of the Federal Government is to leverage change by carefully managed resource expenditures.

The Chicago model is a plan to significantly enhance the ability of teachers in the Chicago Public Schools to deliver math and science instruction. At the earliest levels, children bring their own curiosity and their own discovery potential which can be engaged by appropriate and well-tested techniques of "hands-on" activity-based math/science teaching. As an introduction to the joy of all learning, this has been shown to be enormously effective. As we make the transition through the K-12 sequence, learning about the world progressively enlarges the child's' own experiences and provides the tools necessary for whatever comes next.

Whereas the Chicago Teachers' Academy is enjoying gratifying early results, it is still too soon to tell whether the intrinsic obstacles to dramatic change can be overcome merely by improving teacher preparation. Our indicators will be based upon such things as measuring the number of science hours taught per week in schools which have been through the Academy in contrast to those which have not, in comparing truancy rates, in measuring the demand for continued intervention on the part of teachers, principals, parents

and local school councils. It will be measured by the extent to which teachers and schools "catch fire" and do their own thing in continuing the pace of change--contributing ideas and forming their critical mass groups. Ultimately, it will be measured by falling drop-out rates and improving test scores.

Assuming these indicators soon began to show results, it should still be recognized that the Chicago Academy programs are not unique, infallible solutions to educational reform. Other cities can devise equally exciting programs. With this in mind, we can still define a set of criteria that will serve to guide appropriate legislation. These criteria are applicable to "inner-city" or urban school systems. We remark on rural schools below:

1. The program must be city-wide. After decades of curriculum reform, cognition studies, pilot programs, it is time to act, to deploy what is known while waiting and watching for what continuing research uncovers.

2. The program should be managed by a grouping that is outside the public school system. It is important to have the flexibility and independence thereby provided.

3. The management of the program must include an appropriate combination of corporate managers, university presidents, scientists, teachers, principals, parents and must demonstrate an ability to work with the public school officials to forge a public-private coalition for change.

4. Following a call for proposals, a plan should be submitted by the not-for-profit entity, the analogue of the Chicago Teachers' Academy. The plan should include the personal commitment of a requisite number of community leaders, for example: the CEO of a major corporation, the president of a university, a scientist of significant credentials, etc. It should be endorsed

by the city superintendent of schools and the mayor. The head of the Teachers' Union is another valued signatory. The intent here is to insure that outstanding intellectual and managerial talent is committed to the intervention--an essential part of the federal leveraging requirement.

5. The plan must provide for "follow-up" of teacher enhancement programs. Whatever is done, a pulse of training is all but useless unless it heralds the beginning of a long-term commitment to teachers. In the culture of late 20th century America, the teaching of mathematics and science is a difficult process and the nation's failure is well-documented. For the foreseeable future, it requires continuous attention. The plan must not only retrain teachers, it must serve to enhance professionalism, improve status and assist in recruiting young people into the teaching profession.

6. Collaboration with local teachers' colleges is important since, in the long term, the training of pre-service teachers must be vastly improved.

7. A whole-city plan must include provisions to involving parents, local school councillors, concerned citizens. The plan must present a budget which can be defended and a reasonable apportionment between the federal contribution and local sources. It is the Chicago experience that a viable plan will cost (in Chicago) about $9000-$10,000 per year per teacher. This includes a $2000 per year cost of follow-up. Additional costs are for modest equipment, for workshops, resource center, networks, special programs... to establish a fermenting culture of teacher involvement with the science and professional community. Thus,

as an example, the Chicago Public Schools, the third largest in the U.S., would cost about $30 million per year at peak operation which would see 2500 teachers processing through the academy per year. Of this, perhaps $10 million can be raised from local sources.

Generalizing this to some 25 urban school districts, we arrive at a total cost of about $500 million per year. If we add an equal number of rural areas, we note that a federal intervention of about $1 billion can have a major effect upon science and math education in the nation--addressing the component which has the greatest need: minorities, poor, i.e. the under represented in the science-literate work force. We note that in each city, after a period of (say) five or seven years, the Federal costs should go down as city and state recognize and begin to carry more of the cost burden. Once the bulk of the now in-service teachers have begun to respond, the level of Academy activity also decreases.

Comments:

1. Poor rural areas must be organized into regions large enough to contain excellent management and intellectual entities...i.e. a major university and a large corporation. Here, the smaller number of teachers is compensated by the essential need for technology-- information science and communications to tie remote and small schools together in programs of distance learning, teacher networks, video conferencing, etc.

2. Legislation should encourage the federal agency that manages the program to not impose programs or

recognize the implied competence of the responders and to let them go with a minimum of bureaucratic obstruction. Oversight must, of course, be maintained and the legislation could insist that the plan include evaluation criteria and assessment.

3. In Chicago, there is a strong pressure to open the Academy to private and parochial school teachers. This can be done with minor increases in cost if these entities absorb the cost of substitutes and contribute a modest overhead charge.

CONGRESSMAN ROBERT S. WALKER
OPENING STATEMENTS
SCIENCE EDUCATION JOINT HEARING
FEBRUARY 27, 1992

I want to welcome our witnesses here this morning. I feel that this may well be the most important hearing that the Congress will hold this year. The United States faces a grave challenge in the field of mathematics and science education.

Today more that half of all post-graduate students in America in the areas of mathematics, science and engineering are non-native born Americans. We can take pride in the fact that our colleges and universities are viewed world-wide as the finest, but we must be concerned that the number of American students is at an all time low.

In a global marketplace, where science and technology are the driving force in the world economy, we face the prospect of becoming a non-competitive nation if we do not reverse the downward trend.

I am an educator by training, and I firmly believe that this problem is one that must be addressed at all levels. First, we must get the attention of our children at the earliest elementary years and convince them that science and mathematics are fun and challenging.

We must make science and math interesting at all levels and provide plenty of opportunity for hands-on experience. And we must challenge our children to a lifetime of achievement.

There is a story I use in schools to inspire our youth. Some years ago in Costa Rica a young boy dreamed of becoming an American astronaut. He was the son of a

Chinese father who worked as a foreman on a road building gang that worked throughout Central America, and a Costa Rican mother.

When he finished high school in San Jose he moved to Hartford, Connecticut and lived with an aunt. He entered Hartford Public High School as a senior, and at the end of the first quarter was getting straight "F"s because he spoke no English. By the end of the school year he had so improved that he was asked to be the commencement speaker and the faculty got him a scholarship to the University of Connecticut.

Several weeks later he was called into the office and told that he had lost the scholarship because it was only for Americans, and they had thought he was Puerto Rican, not Costa Rican. He had to leave college because without the scholarship he could not afford to stay. When the faculty at Hartford Public High heard what had happened they went to the Connecticut State Legislature and got the law changed so that he could get the scholarship back.

After graduating from the University of Connecticut he went on the MIT where he earned his doctorate in astrophysics.

Today that young man is Doctor Franklin Chang Diaz, Chief Scientist in the Astronaut Office at the Johnson Spaceflight Center in Houston. He has already flown three Space Shuttle missions and is in training for another.

That young Costa Rican boy did not understand that it was virtually impossible for him to become an American astronaut. He knew what challenged him, and he set out to accomplish his goal.

We need to find ways to challenge the youth of America to equal his accomplishment.

JERRY F. COSTELLO
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Congress of the United States
House of Representatives
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STATEMENT BY U.S. REPRESENTATIVE JERRY F. COSTELLO (D-IL)

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

JOINT HEARING WITH THE COMMITTEE ON EDUCATION AND LABOR

"SCIENCE, MATHEMATICS, AND ENGINEERING EDUCATION"

FEBRUARY 27, 1992

CHAIRMAN BROWN AND CHAIRMAN FORD, THANK YOU FOR CALLING THIS IMPORTANT HEARING. I AM PLEASED TO BE HERE AS WE DISCUSS THE FUTURE OF SCIENCE, MATH, AND ENGINEERING EDUCATION. THIS IS AN EXTREMELY TIMELY HEARING AS THE REVIVAL OF OUR NATION'S EDUCATIONAL PRIORITIES IS OF CRITICAL CONSEQUENCE. I WOULD LIKE TO TAKE THIS OPPORTUNITY TO WELCOME OUR PANEL OF WITNESSES. I AM PLEASED THAT WE HAVE A DIVERSE PANEL TODAY, AND THAT WE WILL HEAR POSITIONS FROM NASA, DEPARTMENT OF EDUCATION, NSF, AND THE OFFICE OF SCIENCE AND TECHNOLOGY POLICY. I AM LOOKING FORWARD TO HEARING THE TESTIMONY.

LIKE MOST OF THE NATION, I WAS ASTOUNDED TO LEARN EARLIER THIS MONTH THAT STUDENTS IN THE UNITED STATES RANKED AMONG THE LOWEST IN THE WORLD IN SCIENCE AND MATHEMATICS. I FIND IT HARD TO BELIEVE THAT THE U.S. CAN PUT THE FIRST PERSON ON THE MOON, AND ONLY TWO DECADES LATER, OUR STUDENTS CANNOT KEEP UP WITH OTHER NATIONS IN SCIENCE AND MATH EDUCATION.

WE MUST IMMEDIATELY ADDRESS THE CHALLENGES OF IMPROVING THE

THIS STATIONERY PRINTED ON PAPER MADE OF RECYCLED FIBERS

QUALITY OF SCIENCE, MATH, AND ENGINEERING EDUCATION. TO THIS END, I BELIEVE THAT THE FEDERAL GOVERNMENT HAS AN IMPORTANT ROLE. DURING THE LAST CONGRESS, THIS COMMITTEE BROUGHT BEFORE THE HOUSE THE "EXCELLENCE IN MATHEMATICS, SCIENCE, AND ENGINEERING EDUCATION ACT." THIS ACT, WHICH PASSED INTO LAW, AUTHORIZED THE ENHANCEMENT OF EDUCATION PROGRAMS, INCLUDING SCHOLARSHIPS, FELLOWSHIPS, AND TRAINING PROGRAMS. WHILE I AM PLEASED WITH THIS TYPE LEGISLATIVE INITIATIVE, I AM HOPEFUL THAT DURING THIS CONGRESS WE CAN FURTHER OUR COMMITMENT.

THE PRESIDENT HAS CHALLENGED THE U.S. TO BECOME FIRST IN THE WORLD IN MATH AND SCIENCE EDUCATION BY THE TURN OF THE CENTURY. THIS IS A BOLD CHALLENGE, BUT CERTAINLY NOT UNOBTAINABLE. I AM CONCERNED, HOWEVER, ABOUT BUDGET LIMITATIONS. WE, AS A NATION, HAVE A LONG ROAD AHEAD OF US TO MOVE FROM THE BOTTOM IN SCIENCE AND MATHEMATICS EDUCATION TO THE TOP IN SIX YEARS.

FY 93 BUDGET REQUESTS FOR NSF, FOR EXAMPLE, IS ONLY A 7 PERCENT INCREASE OVER FY 92. I QUESTION WHETHER THIS IS ADEQUATE FUNDING FOR A PROGRAM WHICH, IN THE PAST, HAS BEEN SUCH A POSITIVE FACTOR IN EDUCATING OUR YOUTH IN SCIENCE, MATH, AND ENGINEERING. I HOPE THAT TODAY'S PANEL WILL ADDRESS THE BUDGET ISSUE AND OUTLINE THEIR STRATEGY FOR MAKING THE U.S. FIRST IN MATH AND SCIENCE EDUCATION.

AGAIN, I WOULD LIKE TO REITERATE MY STRONG SUPPORT FOR THE IMPROVEMENT OF OUR SCIENCE AND MATHEMATICS EDUCATIONAL PROGRAMS. I ALSO THANK THE CHAIRMEN OF BOTH THE SCIENCE, SPACE, AND TECHNOLOGY COMMITTEE AND THE EDUCATION AND LABOR COMMITTEE FOR

THEIR LEADERSHIP AND COMMITMENT TO THIS IMPORTANT ISSUE.

OPENING STATEMENT
OF THE
HONORABLE RICK BOUCHER (D-VA)
CHAIRMAN, SUBCOMMITTEE ON SCIENCE
ON
HEARING ON SCIENCE, MATHEMATICS, AND
ENGINEERING EDUCATION

FEBRUARY 27, 1992

Mr. Chairman, I am pleased to join you in welcoming our panel of distinguished witnesses this morning to discuss a topic which must be at the top of our national priorities -- the improvement of science and math education.

The evidence of recent years is that the creation of new wealth is increasingly tied to technological innovation. For any society to maintain a high standard of living, it is essential to produce sufficient numbers of highly trained workers, from research scientists to technicians on the factory floor.

It is clear that national competitive advantage will increasingly reside in the capabilities of the workforce. It is equally clear that to be educated in the context of the

modern world requires that an individual receive a basic grounding in science and technology. Science literacy has become a basic requirement for employment in an increasing number of jobs, as well as for participating fully as a citizen of a post-industrialized society.

In the United States, the Federal Government is a minor player in K-12 education. Only about six percent of total funding comes from federal sources. However, since there are national interests in educational quality that go beyond state and local interests, it is appropriate for the Federal Government to provide leadership and help spur reform efforts in education by leveraging non-federal resources.

The Office of Science and Technology Policy is to be commended for creating a structure two years ago to coordinate federal efforts in science, math and engineering education. The Committee on Education and Human Resources of the Federal Coordinating Council on Science, Engineering, and Technology first cataloged

existing agency programs and then, this past year, began to address the overall priorities of federal education programs within the agencies, to assess current education programs, and to create a strategic plan for future activities. Drafting a multi-year strategic plan is the most critical task. There is no time to waste if we are to meet the national education goal of the President and Governors, which calls for students in the United States to be first in the world in science and math achievement by the year 2000.

To revitalize and reform science education will require the energy, imagination and resources of all segments of society. I look forward with interest to the discussions this morning which will highlight the progress of the federal efforts at interagency coordination and planning for achievement of our challenging national education goals.

STATEMENT OF CONGRESSMAN DONALD PAYNE

JOINT HEARING ON SCIENCE, MATHEMATICS, AND ENGINEERING EDUCATION

FEBRUARY 27, 1992

55-673 O - 92 - 2

1

MR. CHAIRMAN, I AM PLEASED THAT WE ARE HOLDING THIS JOINT HEARING TODAY TO ADDRESS AN ISSUE WHICH IS OF CRUCIAL IMPORTANCE TO OUR NATION'S CONTINUED ABILITY TO COMPETE IN THE GLOBAL MARKETPLACE.

WITH TECHNOLOGY ADVANCING AT A RAPID SPEED, WORKERS WILL NEED GREATER TECHNICAL KNOWLEDGE AND MORE SOPHISTICATED SKILLS TO FILL THE JOBS OF THE FUTURE.

2

UNFORTUNATELY, OUR PRESENT EDUCATIONAL SYSTEM IS NOT ADEQUATELY PREPARING OUR STUDENTS FOR THIS CHALLENGE. COMPARISONS OF INTERNATIONAL STUDENT PERFORMANCE IN MATH AND SCIENCE SHOW AMERICAN STUDENTS LAGGING BEHIND THEIR COUNTERPARTS IN OTHER COUNTRIES.

AS WE EXAMINE THE OVERALL ISSUE OF AMERICAN STUDENTS' PERFORMANCE IN SCIENCE, MATH, AND ENGINEERING, I THINK WE SHOULD STRESS THE NEED TO ENCOURAGE WOMEN AND MINORITIES TO DEVELOP SKILLS IN THESE TECHNICAL AREAS.

3

DEMOGRAPHIC STUDIES HAVE SHOWN THAT OUR WORKFORCE WILL INCREASINGLY BE MADE UP OF WOMEN AND MINORITIES, WITH WHITE MALES COMPRISING ONLY 15% OF THE THE NET NEW ENTRANTS INTO THE LABOR FORCE OVER THE NEXT 13 YEARS.

PRESENTLY, ONLY ABOUT 5% OF SCIENCE AND ENGINEERING BACHELOR'S DEGREES GO TO AFRICAN AMERICANS, AND FOR PH.D.S , THE FIGURE FALLS TO 2%.

4

WOMEN MAKE UP ABOUT 16% OF THE SCIENCE AND ENGINEERING WORK FORCE, AND ALTHOUGH THIS IS AN IMPROVEMENT OVER THE FIGURE OF 9% WHICH WAS THE RATE IN 1979, IT STILL INDICATES THAT WOMEN ARE UNDERREPRESENTED IN THESE PROFESSIONS.

MR. CHAIRMAN, I HOPE THAT THIS HEARING WILL RESULT IN POSITIVE ACTION TO HELP ALL OF OUR STUDENTS ATTAIN THE PROFESSIONAL EDUCATION AND SKILLS REQUIRED FOR THE WORKFORCE OF THE FUTURE.

ONE MINUTE STATEMENT ON
EDUCATIONAL OPPORTUNITY
BY
HON. TIM VALENTINE (D-NC)

THIS YEAR ABOUT 50 PERCENT OF AMERICA'S GRADUATING SENIORS WILL TERMINATE THEIR FORMAL EDUCATION WITH GRADUATION FROM HIGH SCHOOL. APPROXIMATELY TWENTY PERCENT OF ALL STUDENTS NEVER SEE THEIR GRADUATION CEREMONIES, DROPPING OUT OF HIGH SCHOOL ALTOGETHER. THE DROPOUT RATE RISES TO NEARLY HALF THE STUDENT POPULATION IN MANY URBAN AND SOME RURAL AREAS. THIS IS DUE, IN PART, TO A FAULT IN OUR SYSTEM. MANY HIGH SCHOOL STUDENTS SEE NO CLEAR LINK BETWEEN SCHOOL AND JOBS; OR AT LEAST THEY SEE NO WELL DEFINED ROUTE BETWEEN THE TWO. THEY SEE NO NEED TO TAKE SCIENCE AND MATH COURSES - THE LINK TO HIGHER WAGES IS NOT THERE FOR MOST STUDENTS.

1

WE ASSUME THAT MANY YOUNG PEOPLE WILL FAIL, AND TOO MANY YOUNG PEOPLE FAIL THEMSELVES. THIS MUST BEGIN TO CHANGE RIGHT NOW. WE MUST ENSURE THAT THERE ARE ALTERNATIVE ROUTES FOR STUDENTS TO TAKE FROM HIGH SCHOOL TO HIGHER EDUCATION--BOTH IN THE TRADITIONAL AND THE MORE TECHNICAL AND SCIENTIFIC AREAS OF EDUCATION NEEDED FOR OUR INDUSTRY TO COMPETE. AND WE NEED TO SHOW OUR YOUNG PEOPLE IN CLEAR AND UNMISTAKABLE TERMS THAT THEIR HARD WORK MAKES A DIFFERENCE, THAT THERE ARE STRONG LINKS BETWEEN EDUCATION AND GOOD JOBS.

THANK YOU, MR. CHAIRMAN.

STATEMENT OF
THE HONORABLE RON PACKARD
FULL COMMITTEE JOINT HEARING
SCIENCE, SPACE AND TECHNOLOGY
EDUCATION AND LABOR
SCIENCE EDUCATION
9:30 A.M., 2175 RHOB
FEBRUARY 27, 1992

I WOULD LIKE TO COMMEND ALL OF THOSE WHO ARE INVOLVED IN THE INTERAGENCY PROCESS TO IMPROVE THIS NATION'S SCIENCE, ENGINEERING AND MATHEMATICS EDUCATION. THEY HAVE DONE AN OUTSTANDING JOB IN THE COMPILATION OF THE REPORT, "BY THE YEAR 2000: FIRST IN THE WORLD," AND IN PULLING TOGETHER ALL THE FORCES NECESSARY TO ACHIEVE THE GOALS SET FORTH IN THE REPORT.

IN HIS STATE OF THE UNION ADDRESS, PRESIDENT BUSH ONCE REITERATED HIS COMMITMENT TO MAKE THE UNITED STATES THE WORLD LEADER IN EDUCATION. THIS REPORT GIVES US A SOUND FRAMEWORK FROM WHICH WE WILL BE ABLE TO HELP FURTHER THE GOALS AND OBJECTIVES OF AMERICA 2000. THIS INITIATIVE SPANS THE JURISDICTION OF MANY CONGRESSIONAL COMMITTEES AND WE IN THE CONGRESS HAVE THE CHALLENGE OF UNITING AND WORKING TOGETHER IN A MANNER WHICH WILL ACHIEVE THESE VERY IMPORTANT GOALS IN SCIENCE, ENGINEERING AND MATHEMATICS EDUCATION.

I JOIN IN WELCOMING THE DISTINGUISHED WITNESSES AND I LOOK FORWARD TO HEARING ABOUT HOW THIS REPORT IS BEING IMPLEMENTED.

CONSTANCE A. MORELLA
8TH DISTRICT, MARYLAND
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Congress of the United States
House of Representatives

Constance Morella

Opening Statement,
The Honorable Constance A. Morella
Committee on Education and Labor and
Committee on Science, Space and Technology
"Science, Mathematics, and Engineering Education"
February 27, 1992

Chairman Ford and Chairman Brown, thank you for holding this hearing to review our progress and address our ongoing needs in advancing the development of science, mathematics, and engineering education in this country. In this highly technological and competitive world, our commitment to excellence is critical to the future of the United States.

Predictions of science and engineering experts tell us that the number of students at all levels will fall short of meeting projected national high tech and science needs. The number of students electing majors in science and engineering is very low compared to enrollments in the late 1970s and early 1980s. Still, women and minorities remain a great resource of talent. They have been traditionally far underrepresented in science, mathematics, and engineering.

Women and minorities have become increasingly more important to meeting the high technological needs of this nation. Between 1990 and 2005, women and minorities will account for 86 percent of the net growth in the labor force. Quality math and science education for these people at the earliest levels is essential to their participation and success in the U.S. economy of tomorrow.

A recent study by the American Association of University Women presents evidence based on hundreds of studies that girls are not receiving the same quality, or quanitity, of education as boys. Although they enter school roughly equal in measured ability, young women emerge from our school system behind their male classmates in key areas of math and science. I have introduced a bill which would provide for a comprehensive study of women and the programs and experiences which contribute to their success or failure in the fields of science and engineering. Yet, the AAUW study is evidence that more programs targeted at girls starting in elementary school are needed to place them on equal ground with boys as they consider futures in math and science.

As we review the effectiveness of current programs in addressing issues surrounding math, science, and engineering education, it is imperative that we ask ourselves: "what about girls and women?" and "what about minorities?" The answers to these questions are the means to developing the outstanding education system for which we strive. The result is a strong and competitive America.

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SUBCOMMITTEE ON JUDICIARY AND EDUCATION
REPUBLICAN RESEARCH COMMITTEE
CO-CHAIRMAN, TASK FORCE ON THE STRATEGIC DEFENSE INITIATIVE
CO-CHAIRMAN, TASK FORCE ON TERRORISM AND UNCONVENTIONAL WARFARE

February 21, 1991

Honorable Michael Williams
Assistant Secretary for Civil Rights
U. S. Department of Education
330 C Street, SW
Washington, DC 20202

Dear Mr. Williams:

I am again writing to ask that the Department of Education move forward in issuing letters of findings on all or as many as possible cases of alleged discrimination against Asian American applicants at five different units of the University of California system.

You and I have had a series of meetings and have exchanged correspondence on these outrageously delayed investigations ever since you were sworn in as Assistant Secretary.

The UCLA case is now over four years old with no letter of findings. The UC-Berkeley undergraduate and law school cases are over two years old and still unresolved.

Justice delayed is justice denied.

Frankly I am getting just a little frustrated. This is particularly so when I reviewed some of our past correspondence. On November 20, 1990 you wrote me saying "I would like to reinforce my commitment to you that I expect one or more of these investigations will be completed within the next 120 days..."

I know the comment period on the scholarship regulations ends in about two weeks and you have an excellent decision in the Podberesky v. Kirwan case that backs your initial decision. This decision is also significant with respect to admission discrimination cases.

Given these facts I can see absolutely no reason for any further delay in issuing letters of findings in these very old Asian quota college discrimination cases.

I look forward to a response that will set a date certain within the next month for the issuance of letters of findings in these cases.

Sincerely,

Dana Rohrabacher
Member of Congress

cc: Honorable Lamar Alexander
Honorable David T. Kearns

Tim Kyger
Thursday 27 February 1992
Hearing in the Full Science Committee

QUESTIONS

• These questions are for Secretary of Education Alexander ---

(1.) I have here in my hand *(((show him the article)))* an article about a Filipino American High School student; Valedictorian, 4.5 Grade Point Average, Cheerleading Captain, who applied to the University of California, at Berkeley's, BioEngineering Program.

Jennifer Riel was denied admission even though at least 5 other students from Jennifer's High School with lesser achievements were admitted to Berkeley.

Mr. Secretary, we are in a global economy; a global competition. We are trying to encourage the study of science, math, and engineering. What does it say to

high school students who see what happened to Jennifer? More importantly, what is the Education Department doing about it?

(2.) On Friday, February 22, I sent you a copy of a letter I wrote to Assistant Secretary Michael Williams about Office for Civil Rights letters of findings on investigations of several units of the University of California where there are allegations of quota discrimination against Asian Americans. At least 3 of these investigations are over 2 years old.

I understand these letters of findings are stuck in your Office or in Deputy Secretary Kearns' office.

Can you assure me that these letters of findings will be issued in the next 2 to 3 weeks?

CITY EDITION

San Diego

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SEWAGE CRISIS

Repair work continues on broken pipe, but crews brace for a winter storm

Page 3

THE SAN DIEGO UNION-TRIBUNE • MONDAY, FEBRUARY 10, 1992

UC getting few points for criticized admissions policy

By STEVE SCHMIDT
Staff Writer

Captain of the cheerleader squad, class valedictorian, bigwig in student government — all were achievements in the halcyon days of Jennifer Riel's senior year.

It was the spring of 1991 and, by nearly everyone's account, the Chula Vista girl was enjoying a stellar season at Sweetwater Union High School.

Then she opened her mail.

Neatly folded in a thin envelope was a terse letter from UC Berkeley, telling the Filipino-American that the prestigious university had rejected her application to enroll.

"They said I had to be a well-rounded student," Riel recalled. "Well, what else could I do? I had done just about everything there was to do in high school."

Berkeley accepted at least five other Sweetwater students — all with excellent academic credentials, but none better than Riel's.

The other students happened to be members of underrepresented minorities that Berkeley wanted to woo to campus. Riel was not.

Riel's unexpected rejection — coming as her peers were welcomed — put her in the cross-fire of a growing national debate over the college admissions process.

As families await word in coming weeks on whether their sons and daughters will be accepted into college next fall, educators and others agree that hostility is growing over who gets in and who doesn't.

Affirmative action programs — long a flash point in the nation's struggle over race relations — are again drawing much of the fire.

Simmering resentment among some whites and Asians over such programs, along with the slew of headaches facing higher education administrators, are putting the pinch on efforts to bring more minorities to big-name universities.

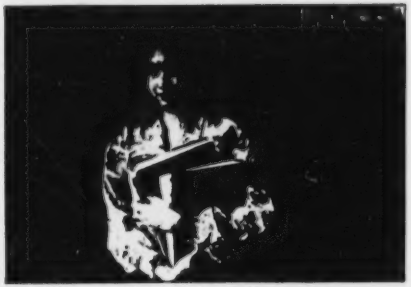
The debate over admissions is particularly sharp on the nine highly regarded University of California campuses, including Berkeley, UCLA and UCSD.

"It's been most dramatically seen in the UC," said Robert Atwell, president of the American Council on Education.

Next fall, UC San Diego expects to hit a milestone. The entering freshman class will likely be the first in which whites are not a majority.

But first the campus has some questions to answer. Prompted by allegations of racial bias, the U.S. Department of Education is conducting an investigation into admissions practices on the La Jolla campus. A report is expected in a few weeks.

See Enroll on Page B-4



UC said no: *Jennifer Riel at Lovola Marymount*

Enroll

Universities face admissions dilemma

Continued from B-1

UCSD administrators defend their admissions policies, calling them fair to all applicants.

"After the civil-rights movement of the 1960s, there was a sense that for the sake of society we have to try to integrate," said Patrick Hayashi, an associate vice chancellor at Berkeley.

"Now, I think the American public is re-examining the shape that commitment is taking," he said.

• • •

In several dog-eared boxes, scattered next to an office water cooler and a Toshiba microwave, sit the makings of controversy.

Box by box, file by file, page by page, a handful of UCSD campus evaluators carefully scrutinize freshman applications for next fall — all 19,050 of them.

More than half the applicants will be offered the chance to enroll when acceptance and rejection letters are sent starting March 2.

In the cases of many applicants, it's not a tough choice.

Most applicants' combined grade-point averages and test scores are so high — or so low — that their acceptance or rejection usually is not in question. Sixty percent of the students who enroll at UCSD are selected solely on academic credentials.

Then there's everyone else.

For students in the middle, test scores and grades are calculated as well, but additional points are assigned that could determine whether UCSD has a spot for them. Are they disabled? That's worth one point. A veteran? One point. Poor? Three points. An underrepresented minority? Three points.

This, university officials say, is one way to right some of the nation's wrongs by allowing minority advancement in largely well-heeled and white institutions.

U.S. Rep. Dana Rohrabacher, R-Los Angeles, bristles at such talk, saying the point system and admissions practices at the UC campuses amount to racial quotas.

"I think it's totally absurd," he said. "What we're seeing here is a bastardization of the whole concept of affirmative action."

In October, Rohrabacher got federal education officials to investigate allegations that UCSD discriminated against a handful of Filipino-Americans who were not admitted last fall.

Because Filipino-Americans and other Asians no longer are considered underrepresented on campus, they are not assisted by affirmative action programs.

John Bunzel, former president of San Jose State University and a former member of the U.S. Civil Rights Commission, believes affirmative action is too entrenched in admissions.

"I have long felt that women and minorities were not in the loop," he said. But, he added, "it's not right to diversify by simply playing the numbers game."

Point systems and other strategies to woo minorities often result in cockeyed trade-offs, critics like Bunzel and others argue.

Should a top-flight Hispanic student from a rich family be admitted but not a poor white student with similar grades? If American Indians continue to get special consideration in admissions, why shouldn't impoverished immigrants from Southeast Asia?

"It's not a science," said UCSD admissions director Ronald Bowler.

Even some longtime supporters of affirmative action agree that it has been unevenly applied at times.

"To be sure, it has lumbered and creaked. It has worked slowly and incompletely," New Jersey professor Catharine Stimpson wrote in a recent issue of The Chronicle of Higher Education, an influential academic journal.

But, she wrote, "the important reality is this: affirmative action has worked."

Minority attendance at colleges nationwide rose during the last half of the 1980s largely due to aggressive recruitment, according to the American Council on Education.

From 1988 to 1990, the percentage of black students grew 8.2 percent, while Hispanics posted an 11.5 percent increase.

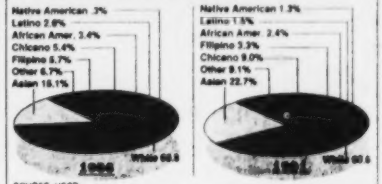
The figures are less encouraging within the UC system, where the number of black and Hispanic undergraduates has seen little gain in recent years.

The Latino population at UCSD has grown from 5.1 percent of the undergraduates in 1986 to 7.5 percent today. The percentage of blacks has actually slipped — from 2.9 percent to 2.8 percent.

UC administrators, frustrated by the numbers, have stepped up recruitment drives in recent years at high schools and community colleges.

Ethnic distribution of first-time freshmen at UCSD: 1986 and 1991

Over the last few years, UCSD has become increasingly diverse. In 1986, whites represented 61% of the freshman class; today they represent 51%. The largest proportional enrollment gain is among Asian Americans who represented 15% of the freshman class in 1986 and 23% in 1991.



SOURCE: UCSD

Union-Tribune / JIM BURNETT

BEST COPY AVAILABLE

SAN DIEGO UNION Monday, February 10, 1992

High school dropout rates remain high among Hispanics and blacks. In addition, only a small percentage of those who do graduate meet UC eligibility standards.

Under state mandate, only the top 12.5 percent of California's high school graduates are eligible for UC admission.

Rather than fiddling with points and other ways to beef up minority representation, critics of affirmative action say educators should instead try to improve high school graduation rates.

With many Asians, it's another story. The percentage of Asians has grown so high that UCSD and other campuses no longer consider them underrepresented.

Largely because of the rise in Asians, the freshman class at UCSD entering next fall is expected to be the first in which whites are not a majority.

In recent years, both UCLA and UC Berkeley have modified their policies to ease concerns over admission limits that some viewed as having an anti-Asian bias.

Now with the federal investigation, UCSD is in the hot seat.

Joseph Watson, UCSD vice chancellor for undergraduate affairs, said the campus has done nothing wrong, despite assertions by Congressman Rohrabacher that the university's affirmative action policies have hurt both Asians and whites.

The conservative congressman demanded the federal investigation after reading a newspaper account regarding several Filipino applicants.

Watson said Rohrabacher made no attempt to contact the campus before calling for the probe, giving the impression that his demand was politically driven.

In recent months, the Bush administration has called into question the use of minority scholarships and whether private accrediting agencies should continue to look at campus affirmative action policies.

"That all sends a very discouraging message that has a chilling affect on affirmative action," said American Council on Education President Atwell.

Those moves — timed with the recession, budget cuts in education and skyrocketing student fees — have fed the backlash against affirmative action, educators say.

Said Watson: "As families feel more under the financial gun, more anxious about their futures . . . , there's going to be more tension with this."

• • •

Jennifer Riel said that when she was a young girl, her immigrant parents encouraged her "to work very hard and to attain what they couldn't."

Last year, she graduated valedictorian at Sweetwater Union High School. Her grade-point average was a better than perfect at 4.5 because of several honors courses.

Then came word from Berkeley.

Administrators told her she had applied for the most competitive major on campus — bioengineering.

"After the civil rights movement of the 1960s, there was a sense that for the sake of society we have to try to integrate. Now, I think the American public is re-examining the shape that commitment is taking."

PATRICK HAYASHI
Associate vice chancellor, Berkeley

"Our denial of Riel's application for admission is not a negative reflection on her achievement," a campus official wrote at the time. "It is entirely a reflection of our inability to accommodate the extraordinary demand for places at Berkeley."

Riel wanted to change her major on her application ! t was not allowed to under Berkeley policy.

Today, she attends Loyola Marymount University in Los Angeles. She said she is not happy there and is considering applying to USC.

Meanwhile, in thousands of San Diego households — from the city's hilltop spreads to its poorest neighborhoods — the wait is on.

Families are starting to get letters from campuses nationwide telling them whether their children made it into their college of choice.

Serra High School senior Tracy Ward has her sights on Duke University in North Carolina. Ward, who has a 4.6 grade-point average, has also applied to three UC campuses.

But, she explained, "being white and middle-class, it doesn't make me stand out at all."

Still, she has no qualms about affirmative action. "I've had all the opportunities I could want," she said. "So many people don't get those."

Aaron Glynn of Bonita Vista High School in Chula Vista is hoping to get accepted into a college in Colorado.

The 17-year-old senior believes affirmative action has "gone a little too far."

But Glynn himself may benefit from a type of affirmative action as well. Glynn said he has applied to a campus that give special consideration to those with his sort of handicap: dyslexia.

"I should get a little break to get in," he said.

NEWS from

Congressman

Dana Rohrabacher

1039 LONGWORTH BUILDING • WASHINGTON, D.C. • 202-225-2415

For Immediate Release:
February 27, 1992

Contact: Gary Curran
(202) 225-2415

Congressman Rohrabacher Presses Department of Education to Complete Asian Discrimination Reports

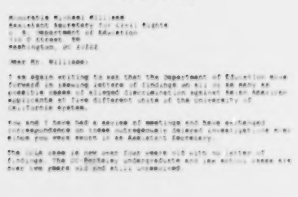
(Washington, D.C.) -- Congressman Dana Rohrabacher (R-CA) today labeled the U.S. Commission on Civil Rights report entitled, "Civil Rights Issues Facing Asian Americans" as "a step forward." Rohrabacher, while noting that the report addresses the issue of Asian American discrimination in university and college admissions, said that it is now critical for the U.S. Commission on Civil Rights bring pressure to bear to the Department of Justice and Office of Civil Rights at the Department of Education to bring enforcement action to ensure this form of racism ends.

"Asian American students that apply to some of our major universities and colleges are being discriminated against because of their race. Whether its done in the name of affirmative action or not, it is race based decision making and it is illegal," Rohrabacher said. "While I am happy that the U.S. Commission on Civil Rights addressed this problem, they must follow up with real pressure on the appropriate federal agencies which have been dragging their feet investigating this issue."

Rohrabacher also released a letter to Mr. Michael Williams, the Assistant Secretary for Civil Rights at the Department of Education, complaining about the Department's outrageous delays in investigating college admissions discrimination. Rohrabacher emphasized in the letter that "Justice delayed is justice denied."

Secretary of Education Lamar Alexander will be testifying before the House Space, Science and Technology Committee on Thursday, February 27, and Rohrabacher will press Mr. Alexander on the issue.

The text of the letter follows:



February 27, 1992

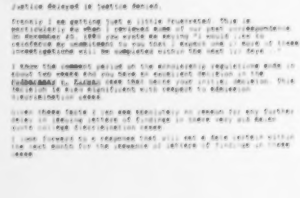
Honorable Michael Williams
Assistant Secretary for Civil Rights
U. S. Department of Education
330 C Street, SW
Washington, DC 20202

Dear Mr. Williams:

I am again writing to ask that the Department of Education move forward in issuing letters of findings on all of my many outstanding cases of alleged discrimination against Asian American applicants at five different units of the University of California system.

You and I have had a series of meetings and have exchanged correspondence on these outstanding Asian/Pacific American civil rights cases that were sent to my office by the Assistant Secretary.

The oldest case is now over four years old with no letter of findings. The UC Berkeley undergraduate and law school cases are over two years old and still unresolved.



Justice delayed is justice denied.

Frankly I am getting just a little frustrated. This is particularly so after I received some of my past correspondence in December 20, 1991 you wrote me saying "I would like to reinforce my commitment to you that I expect and it is mine if these investigations will be completed within the next six days."

I know the comment period on the antiquity regulations ends in about two weeks and you have an excellent decision in the Podberesky v. Kirwan case that could inform your policy decision. This decision is also significant with respect to admission discrimination cases.

Given these facts I can see absolutely no reason for any further delay in issuing letters of findings in these very old Asian/ pacific college discrimination cases.

I look forward to a response that will set a date certain within the next month for the issuance of letters of findings in these cases.

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PODBERESKY VERSUS KIRWAN

HON. DANA ROHRABACHER

OF CALIFORNIA

IN THE HOUSE OF REPRESENTATIVES

Thursday, February 20, 1992

Mr. ROHRABACHER. Mr. Speaker, on January 31, 1992, the U.S. Court of Appeals for the Fourth Circuit issued a most important decision in Podberesky versus Kirwan, a case concerning the administration by the University of Maryland at College Park of a program of race specific scholarships. The circuit court reversed and remanded a Federal district court decision allowing the race specific scholarship program to stand.

The circuit court, in an unanimous decision, found that the necessary finding of current effects of past discrimination had not been made by the trial court nor was there any such evidence in the appeals record, and that absent such evidence, a race specific scholarship program violated the rights of the plaintiff who was not a member of the advantaged race.

The court said: "Accordingly, we hereby reverse the grant of summary judgment and remand the action to the district court for a determination as to the present effects of past discrimination at UMCP. Should no further evidence be available upon remand, summary judgment for appellant would be appropriate."

The decision is, according to press reports, the first time a circuit court has decided a case concerning the constitutionality of race specific scholarships. It is a signal that race restricted programs are not to be allowed unless they are narrowly tailored to remedy specific present effects of past discrimination.

Although this case involved a scholarship program, it has significant implications for race specific admissions programs. Clearly it is impossible to apply this standard to scholarships and not apply it to college and university admissions policies and practices.

I insert at this point in the RECORD the decision of the U.S. Circuit Court of Appeals for the Fourth Circuit.

(U.S. Court of Appeals for the Fourth Circuit, No. 91-2577)

DECISION

(DANIEL J. PODBERESKY, *Plaintiff-Appellant*, v. WILLIAM E. KIRWAN, President of the University of Maryland at College Park, UNIVERSITY OF MARYLAND, at College Park, *Defendants-Appellees*, STATE OF OHIO; STATE OF IDAHO; STATE OF ILLINOIS; STATE OF SOUTH DAKOTA; STATE OF VERMONT, STATE OF VIRGINIA; STATE OF WEST VIRGINIA; NAACP LEGAL DEFENSE AND EDUCATION FUND, INC., *Amici Curiae*.)

Appeal from the United States District Court for the District of Maryland at Baltimore. J. Frederick Motz, District Judge. (CA-90-1682-JFM)

Argued: October 31, 1991.

Decided: January 31, 1992.

Before Widener and Hamilton, Circuit Judges, and Restani, Judge, United States Court of International Trade, sitting by designation.

Reversed and remanded by published opinion. Judge Restani wrote the opinion, in which Judge Widener and Judge Hamilton joined.

OPINION

Restani, Judge:

Appellant, Daniel J. Podberesky, appeals from a grant of summary judgment entered on May 15, 1991. Appellees are the president of the University of Maryland at College Park ("UMCP") and UMCP itself, which maintains a race-based scholarship program from which appellant was excluded. Appellant sued for injunctive, declaratory and compensatory relief alleging violations of his rights under the Fourteenth Amendment and 42 U.S.C. §§ 1981, 1983 and 2000d *et seq.*

Background

Appellant is a nineteen year old Hispanic male who was admitted to UMCP in the fall of 1989. As an applicant to UMCP, appellant had an excellent academic record: his Scholastic Aptitude Test score was 1340, out of a possible 1600; his grade point average as calculated by his high school was over 4.0 (as calculated by UMCP, his grade point average was 3.54), and he actively participated in several extracurricular activities.

Along with this application to UMCP, the appellant requested that he be considered for an academic scholarship.[1] UMCP maintains several scholarship programs, one of which is the Benjamin Banneker Scholarship Program ("Banneker Program" or "Banneker Scholarship"), a scholarship program not based on need, under which a minimum of twenty scholarships are awarded each year. UMCP established the Banneker Program in 1978; however, for the first decade of its existence it was limited in scope. Originally, the program provided two-year scholarships with stipends of $1,500 per year. In approximately 1983, the program was expanded to four-year scholarships. In 1985, the amount of the scholarship was increased to full in-state tuition or cost-of-state tuition, plus room, board and mandatory fees, worth in excess of $33,500 over the four years.

At the time appellant applied for the Banneker Scholarship, the minimum requirements for further consideration under the Banneker Program were a 900 Scholastic Achievement Test score and a 3.0 grade point average. Only students of African-American heritage are considered for the Banneker Scholarship.[2] Appellant's credentials exceed those required for further consideration under the Banneker Program; nevertheless, appellant was not considered for this scholarship because he was not of African-American heritage.

The Banneker Program was intended as a partial remedy for past discriminatory action by the State of Maryland. For many

[1] It should be noted that the race-based classification at issue relates to non-need-based scholarship program voluntarily established by appellee. Thus, this situation is distinguishable from *Adarand Constructors, Inc. v. Skinner*, 916 F.2d 1470 (10th Cir. 1990) (en banc), *cert. granted sub nom. United States v. Molina*, 111 S.Ct. 1679 (1991), in which black prisoners sought mandatory remedies for alleged violations of their thirteenth amendment rights to various components of prison education in Mississippi institutions "minimal educational standards and curriculum, university staff competitions, institutional mission, provision and maintenance of facilities, allocation of financial resources, curricular offerings and placement of programs, operations of branch programs, allocation of and grant functions, and the composition of the Board of Trustees and its staff." *Id.* at 978.

[2] Applicants not meeting this last criterion are still eligible to compete for the other merit-based, academic scholarship, the Francis Scott Key Scholar Program ("Key Program"). The Key Program provides benefits identical to those given under the Banneker Program to approximately 35 students. In order to be considered further under the Key Program, an applicant must have a "predictive index" of 66. This index is calculated by reference to the Scholastic Aptitude Test score and grade point average. Appellant's predictive index was 62; therefore, he was not entitled to further consideration for a Key scholarship.

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years the State of Maryland maintained a system of higher education consisting of separate, racially segregated institutions." After Brown v. Board of Education, 347 U.S. 483 (1954). Congress enacted Title VI of the Civil Rights Act of 1964 which forbids federal fund recipients from discriminating in any manner on the basis of race, color or national origin. 42 U.S.C. 2 [2000d et seq. (1964). In 1969, the Office for Civil Rights ("OCR") of the Department of Health, Education and Welfare (now the Department of Education) notified Maryland that its higher education system was still segregated in violation of Title VI. If OCR is unable to obtain compliance with Title VI, it is authorized to initiate formal administrative proceedings against the offending institution. OCR has never initiated formal proceedings against UMCP.

Between 1969 and 1974, Maryland submitted three desegregation plans to OCR. After receiving the first two, OCR accepted the third plan in 1974. In 1975, the Acting Director of OCR informed the state that it was still in violation of Title VI. In 1976, OCR published new guidelines which set forth criteria required for preparation of acceptable plans for post secondary public education.

In 1980, Maryland adopted the Equal Educational Opportunity Plan for 1980-1985 ("1980-85 Plan"), in which it attempted to meet the requirements of the 1976 guidelines. The 1980-85 Plan contained many goals, one of which was a freshmen class at UMCP that included between ten to twelve percent black students by the year 1985. The Banneker Program was not mentioned in this plan. In May 1985, UMCP specifically mentioned the Banneker Program to OCR when it submitted a "Black Undergraduate Recruitment Program." In June 1985, the State adopted the Plan to Assure Equal Post Secondary Educational Opportunity 1985-89 ("1985-89 Plan"). In this plan, Maryland established a goal of fourteen percent black freshmen at UMCP by the year 1989. No mention was made of the Banneker Program.

In its comments to the 1985-89 Plan, OCR noted that UMCP presented "a detailed discussion of recruitment measures which include listings of recruitment tools, outreach strategies, on-campus programs, summer programs activities to attract prospective black applicants, recruitment visitors and follow up procedures." Appendix ("App.") at 310. OCR, however, did not directly acknowledge the Banneker Program. In 1987, UMCP submitted a revised "Black Undergraduate Recruitment Program" in which it listed the Banneker Program as an example of the expanded merit-based financial aid for minority students.

OCR is currently visiting public institutions of post secondary education to determine the progress made under the 1985-89 Plan. Maryland states that it will continue to follow the goals set forth in the 1985-89 Plan until a new one is developed. Accordingly, UMCP plans to continue offering the Banneker scholarships to black freshmen.

Discussion

We review a decision granting summary judgment de novo. *See e.g. Miller v. Federal Deposit Ins. Corp.*, 906 F.2d 972, 974 (4th Cir. 1990).

The trial court correctly found that the Banneker Program should be examined in light of the equal protection clause of the Fourteenth Amendment and subjected to a strict scrutiny test. To survive strict scrutiny, as the trial judge noted, an affirmative action plan must serve "a compelling governmental interest" and be narrowly tailored to the achievement of that goal. App. at 158 (citing *Wygant v. Jackson Bd. of Educ.*, 476 U.S. 267, 274 (Powell, J.) (1986)).

In *Wygant*, the Supreme Court held that "societal discrimination" was a concept too amorphous in nature to supply the justification for a race conscious classification. Id. at 276 (plurality opinion). Because of the danger of stigmatic harm, classifications based on race, understandably, must be reserved for remedial settings. *City of Richmond v. J.A. Croson Co.*, 488 U.S. 469, 493-94 (1989).

At issue in *Croson* was a plan adopted by the City of Richmond requiring general contractors who were awarded city construction contracts to sub-contract at least thirty percent of the total dollar amount of each subcontract to a "Minority Business Enterprise" (a business at least fifty one percent owned and controlled by individuals of certain specified racial and ethnic minorities). The Court found that the city had failed to demonstrate a compelling governmental interest which justified the plan. Id. at 505. Finding it significant that the city was unable to point to any identified discrimination in the Richmond construction industry, the Court rejected Richmond's claim that past discrimination could justify racial setasides. Id. at 505-06. The Court emphasized that Richmond must have a "strong basis in evidence for its conclusion that remedial action . . . [is] necessary." Id. at 500 (quoting *Wygant*, 476 U.S. at 277).

Classification based upon race must be justified by specific judicial, legislative, or administrative findings of past discrimination. Id. at 497 (quoting *University of California Regents v. Bakke*, 438 U.S. 265, 307 (1978)). It is the state (that must show the existence of prior discrimination, and a strong evidentiary basis for concluding that remedial action is necessary. Id. at 500.

The district court stated that "[t]he question . . . [is] whether UMCP has demonstrated with sufficient particularity that it has a history of racial discrimination which can justify the Banneker Program's existence." App. at 160. In answering this question, the court found OCR's administrative "findings" concerning the noncompliance of Maryland with Title VI demonstrated past discrimination.* The court rejected appellant's view that a formal court or administrative agency finding of noncompliance was necessary in order to satisfy the evidentiary standard in *Croson*, 488 U.S. 469. Finding that *Croson*'s "strong basis in evidence" was satisfied in this case,*

Once a court has determined that a state has proceeded upon strong evidence of discrimination in other than the immediate past, the inquiry into the legitimacy of a *race based classification turns to the state's* basis for finding continuing effects of such past discrimination. In *Bakke*, a case involving explicit racial classifications in the admissions process of a graduate school, the Supreme Court stated that "[t]he State certainly has a legitimate and substantial interest in ameliorating, or eliminating where feasible, the *disabling effects* of identified discrimination." *Bakke*, 438 U.S. at 307 (emphasis added). By focusing the inquiry on the present-day effects, the Court limited the race-based action to redressing the present continuing manifestations of past discrimination. In *Wygant*, the Court continued to emphasize that the legitimate objective behind such affirmative action policies is to remedy "the *present effects* of past discrimination." *Wygant*, 476 U.S. at 280 (emphasis added)(quoting *Fullilove v. Klutznick*, 448 U.S. 448, 480 (1980) (opinion of Burger, C.J.)).

In *Croson*, the Court stated that "if the city could show that it had essentially become a 'passive participant' in a system of racial exclusion practiced by elements of the local construction industry, we think it clear that the city could take affirmative steps to dismantle such a system." *Croson*, 488 U.S. at 492. Thus, *Croson* indicates that race-based action may be legitimate governmental action if it is designed to "dismantle" or remedy discriminatory aspects of a system. The Court obviously intended that for a program to withstand scrutiny, there must be some discriminatory effect which could be the subject of present remediation.

Although it recognized that the program could not withstand scrutiny unless the state could cite present effects of past discrimination, the district court wavered at this point. The court began its analysis of present effects by observing that there was "some evidence" that there were no *present effects* of past Title VI violations at UMCP. Specifically, the court noted that in 1988, UMCP exceeded its goal for recruiting black freshmen, and nearly met its goal for retention of black undergraduates. The record before this court indicates that during the academic years 1989 and 1990, more than fifteen percent of the incoming freshmen class was black.

Moreover, the court observed that the President of UMCP testified that, with regard to admission and financial aid, UMCP had not discriminated against blacks for many years. Although the President of UMCP referred to the "lingering effects of historic discrimination" in his deposition, app. at 453, he did not explain what he meant. As indicated in *Croson*, general societal harm is insufficient.

The district court concluded that the effects of longstanding discrimination were so pervasive that it was "premature to find that there are no present effects of past discrimination at the institution." *Id.* at 167A. Later, the district court referred to the "now dormant specter of past discrimination." *Id.* Based upon this language, it appears that the district court, although rec-

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* Specifically, black residents of Maryland were limited to attending one of the four "black colleges" in the state: Bowie State, Coppin State, Morgan State and University of Maryland Eastern Shore.

* In the acting brief of the State of Ohio et al., it is argued that a state has a compelling interest in the promotion of racial diversity that would support the Banneker Program. The district court did not cite the need for diversity as a basis for the program, and it does not appear that UMCP established the Banneker Program with this goal in mind. Moreover, in *University of California Regents v. Bakke*, 438 U.S. 265 (1978), the Court stated that:

> The diversity that furthers a compelling state interest encompasses a far broader array of qualifications and characteristics of which racial or ethnic origin is but a single though important element. Petitioner's special admissions program (a set-asside number of places for certain minorities) focuses solely on ethnic diversity. would hinder rather than further attainment of genuine diversity."

Id. at 315 (emphasis in original). In this case, the scholarship funds are set aside for black students only and ethnic diversity does not appear to be the main interest behind the program.

* Stating that "[i]f ever there was an administrative record demonstrating past discrimination, this is it," app. at 161A, the court found that OCR's findings, together with continuing OCR review of UMCP's desegregation efforts, were sufficient to demonstrate a past history of discrimination. The court stated that even if no federal officer knew about or approved of the Banneker Program, it was largely irrelevant." The court went on to find however that the fact that OCR reviewed and revised the recruitment plan submitted by UMCP indicated that OCR knew about the Banneker Program.

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cerning the need to identify some present effect of past discrimination, failed to make a specific finding of such present effect. Rather, it merely found that it would be prudent to keep the race-exclusionary scholarship in place at least until OCR concluded its investigation of UMCP. While this might be perceived as fair to UMCP, it does not satisfy constitutional standards. As indicated earlier, in order to justify a race-based remedy in a case where identifiable discrimination occurred a number of years in the past, a finding of such past discrimination is not sufficient. There must be some present effect of this past discrimination that the program is designed to redress.

Conclusion

In determining whether a voluntary race-based affirmative action program withstands scrutiny, one cannot simply look at the numbers reflecting enrollment of black students and conclude that the higher educational facilities are desegregated and race-neutral or vice versa. It may very well be, given the complexities of institutions of higher education and the limited record on appeal, that information exists which provides evidence of present effects of past discrimination at UMCP, but no such evidence was brought to our attention nor is it part of the record. The Supreme Court has declared that in some situations the State may enact a race-exclusionary remedy in an attempt to eliminate the effects of past discrimination. The proper focus at this stage is whether present effects of past discrimination exist and whether the remedy is a narrowly tailored response to such effects.

Judgment for appellees must be based on facts which show that vestiges of past discrimination existed, which made the 1988-90 form of the Banneker Program a legitimate, constitutional remedy on or about the time appellant was denied the opportunity to compete for the scholarship. Accordingly, we hereby reverse the grant of summary judgment and remand this action to the district court for a determination as to the present effects of past discrimination at UMCP. Should no further evidence be available upon remand, summary judgment for appellant would be appropriate.

Reversed and remanded.

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E-1

UCLA GRADUATE MATH DEPARTMENT INVESTIGATION

HON. DANA ROHRABACHER
OF CALIFORNIA
IN THE HOUSE OF REPRESENTATIVES

Thursday, February 20, 1992

Mr. ROHRABACHER. Mr. Speaker, the Office for Civil Rights [OCR] at the U.S. Department of Education has had pending for years administrative complaints of racial quotas or other discriminatory practices in admissions at four units of the University of California. The investigation of the UCLA undergraduate admissions program is now over 4 years old. No letter of findings has been issued. On October 1, 1990 OCR found that the university's graduate math department had discriminated against Asian-American applicants.

OCR also has investigations of racial discrimination against Asian-Americans pending against the admissions policies of the undergraduate and law school programs of the University of California at Berkeley—both of which are over 2 years old. Another investigation program of the admission policy is continuing at the undergraduate program of the University of California at San Diego.

I realize that these cases are sensitive but these long delays are unacceptable. The constitutional rights of applicants in these institutions are at stake.

I hope that the January 31, 1992 unanimous decision of the U.S. Circuit Court of Appeals for the Fourth Circuit in Podberesky versus Kirwan will embolden the Department of Education to issue letters of findings in all four UC system admissions cases they have pending—they are long overdue.

For the enlightenment of my colleagues I will insert at this point in the RECORD the letter of finding from OCR in the UCLA graduate math department investigation.

Congress should add its voice to urge the department to issue letters of findings in these four pending cases by adding the text of my bill House Concurrent Resolution 102 to the Higher Education Act reauthorization bill that the House is expected to debate this spring.

The letter follows:

U.S. DEPARTMENT OF EDUCATION,
OFFICE FOR CIVIL RIGHTS
San Francisco, CA, October 1, 1990

Dr. Charles E. Young
Chancellor, University of California, Los Angeles (UCLA), Los Angeles, CA
Attn: Winston C. Doby, Vice Chancellor of Student Affairs

(In reply, please refer to Docket #09-89-6064)

DEAR CHANCELLOR YOUNG: This letter and the enclosed "Statement of Findings" result from a compliance review by the Office for Civil Rights (OCR)[1] to determine whether UCLA discriminates against Asian Americans,[2] on the basis of race in admission to the graduate educational programs of the University. This investigation was conducted under the authority of Title VI of the Civil Rights Act of 1964, 42 U.S.C. Section 2000d *et seq.* and its implementing regulation, 34 C.F.R. Part 100. As a recipient of federal financial assistance administered by the Department of Education, UCLA is required to comply with the provisions of this statute, which prohibits discrimination on the basis of race, color, and national origin.

SUMMARY OF FINDINGS

Using data pertaining to the admissions decisions for students entering in the Fall of 1988, 1987, and 1988, OCR reviewed 84 graduate programs. OCR found compliance with Title VI in all but nine programs. In some instances the compliance finding was based on a statistical overview of the program. In other instances, the statistical overview and direct examination of file and interviews of faculty and staff revealed that the race-neutral criteria for admission to the program were applied equally, without regard to race.

For eight programs there was insufficient data available to OCR to determine compliance with Title VI. As to these programs, OCR is making no finding and is requiring additional record-keeping concerning future admissions decisions. OCR will seek to determine whether in the next three years these programs are making their admissions decisions in compliance with Title VI.

With regard to one program, the Mathematics Department, OCR found noncompliance with Title VI. As to this program, OCR is requiring both record-keeping and corrective action as to some individual applicants denied admission.

A more complete overview of the results of this investigation is stated in the remainder of this letter. A detailed discussion of the OCR findings is set forth in the enclosed Statement of Findings.[3] This letter of findings only concerns the results of OCR's investigation of the practices of the UCLA Graduate Division. It does not address the investigation of the admissions practices of the UCLA Undergraduate program, which remain under investigation at this time.

PROCEDURAL HISTORY

In 1987, reports of a growing concern about the treatment of Asian American applicants to colleges and universities came to the attention of the Department of Education. This concern was manifested in journalistic reports and letters from students, parents, and Federal and State legislative representatives. Consequently, the Office for Civil Rights asked for and received from the University of California (U.C.) Systems Office statistical reports comparing by race the rate at which applicants were admitted to the graduate and undergraduate programs of the nine universities in the UC system.

Based on differences in admission rates for white applicants and Asian American applicants, OCR decided to conduct a review of admissions practices of the graduate programs at UCLA.

This review has required a large commitment of resources by the University and OCR. UCLA's Graduate Division enrolls 15,000 students. On several occasions, repre-

[1] For purposes of this investigation Asian American includes Chinese, Japanese, Korean, Philippine, Polynesian, Thai and Other Asians. The statistics do not include East Indians and Pakistani as Asian Americans. American citizens and permanent residents are included as domestic students. Foreign students, i.e. those students in the U.S. on a student visa, are not included in this review; their entry into the University is often governed by significantly different criteria.

[2] The applicable time period covered by this investigation includes the time during which Graduate admission decisions were made for classes entering in Fall 1986, 1987 and 1988. However, as noted in each departmental discussion contained in the attached Statement of Findings, conclusions may not have been reached for each of these years. Conclusions were dependent upon whether applicant files were physically available for review.

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sentatives of OCR met with UCLA management, on the campus and at the OCR Regional Office. On three separate visits to the UCLA campus, OCR interviewed staff. Regional Office. On three separate visits to the UCLA campus, OCR interviewed staff, faculty and students and reviewed student admission files. Over 200 persons were interviewed and over 2,000 files were reviewed and analyzed.

Because of variations in how departments are organized operationally, the number of graduate programs in operation at UCLA may vary. Under OCR's count, in the Fall of 1988, UCLA operated 97 programs. Three of these programs were operated separately from the Graduate Division, and were not included in the system-wide statistics provided to OCR: Law, Medicine, and Dentistry. These programs were not investigated.

All applications for the other 94 programs are sent to the Graduate Division for screening. However, each graduate program has its own admissions procedures and criteria. In effect, OCR conducted 94 distinct reviews. Moreover, the admissions decision is not always made at the school or department level. For example, in the Department of Psychology, admissions decisions regarding applicants specializing in Clinical Psychology are made by a different group of faculty, using different criteria, than are used for applicants specializing in Social Psychology.

OCR developed a methodology to identify those departments most likely to reveal concerns about the equal treatment of Asian applicants. Approximately half of the 94 programs (43) were eliminated because a review of the Graduate Division statistics for a three year period revealed, either very few or no Asian persons applied to the department for admission, and the data did not reveal any indicators of discrimination, or Asians were consistently admitted at a higher rate than whites, and the data did not reveal any indicators of discrimination.

All remaining departments were subject to further review.

OCR eliminated from further review another nine departments, whose data indicated no Title VI compliance problems because the following three conditions pertained simultaneously:

Data provided by the Graduate Division revealed no disparity in the rates at which Asian and white applicants were admitted.

The calculated mean undergraduate grade point average (GPA) for Asian and white applicants suggested that the rates of admissions for these two groups were appropriate.

There was no departmental statistical report available to contradict the Executive Order statistics of the Graduate Division.

Seven more departments were eliminated because "no statistical patterns indicating no Title VI compliance problems existed simultaneously."

Departmental data revealed that Asian applicants were admitted at a higher rate than or the same rate as white applicants in two of the three years examined.

The calculated mean GPA for Asian and white applicants suggested that the rates of admission for these two groups were appropriate.

One department was eliminated because almost everyone who applied for admission was accepted into the program. Further, those few persons rejected appeared to be excluded on educationally justifiable grounds.

While engaged in the process described above, OCR became acquainted with additional specialty areas or programs with separate admissions criteria and procedures. The following is a list of the 33 separate admissions specialty areas investigated in the next phase of OCR's compliance review:

Architecture and Urban Planning (two specialties).
Biological Chemistry.
Chemistry and Biochemistry (two specialties).
Engineering (fourteen specialties).
Experimental Pathology.
Linguistics.
Management.
Mathematics.
Molecular Biology.
Pharmacology.
Philosophy.
Physiology.
Political Science.
Public Health (seven specialties).

OCR investigated the admissions practices of each of these programs. Although the Graduate Division had provided some statistics for each Department, most Schools or Departments had summary reports or computerized data of their own regarding applicants for admission. Typically, these were separated by the specialty area for which admissions decisions were made. During the file review, OCR verified and/or collected additional statistical information. UCLA, in response to a written request from OCR, submitted a written description of the admissions process and criteria used for each School and Department reviewed during the on-site. In addition, OCR conducted interviews with staff and faculty who developed and applied the criteria and process used in making admissions decisions. This was done to better understand the written description, to supplement the written description, and to identify any criteria that weighed more heavily than others.

OCR then examined files of successful and unsuccessful Asian and white applicants for admission. OCR considered whether there was information in the files that corroborated the descriptions of the admissions criteria and procedures provided by the UCLA written submissions to OCR and in the interviews. Most important, OCR also considered whether the procedures and the criteria for admission were applied in a non-discriminatory manner for Asian and white applicants.

These actions concluded OCR's data collection process. The next step in the compliance review was to examine the accumulated information under the requirements of Title VI.

LEGAL STANDARD

The Title VI regulation at 34 C.F.R. § 100.3(b) prohibits certain discriminatory acts including treating individuals differently on the basis of race or national origin in determining whether he she satisfies the admissions requirements of a recipient. This section also prohibits denying an individual a "service or benefit" under a program of the recipient on the basis of race or national origin. The regulation further states that a recipient may not utilize criteria or methods of administration that have the effect of subjecting individuals to discrimination on any of these bases.

To apply these regulations in the review of admissions decisions, OCR relies on two legal standards. First, OCR will examine whether the recipient discriminates against members of a particular racial or national origin group, such as Asians, by treating them differently. Second, OCR will investigate whether facially neutral admissions criteria used by the recipient have a disparate impact on applicants who are members of a particular racial or national origin group. If a disparate impact is identified, OCR will investigate whether the criterion is educationally justifiable. Both investigative approaches provide deference to the academic expertise of the faculty to establish criteria for admission.

In this case, OCR relied on the first standard and investigated whether Asian applicants were treated the same as similarly situated white applicants. OCR determined whether each graduate program imposed its own standards in a way that was consistent, without regard to race. Where a decision was not explained by admissions criteria, justifications were sought from UCLA faculty and staff. In turn, these justifications were tested by seeing if they were related to the established admissions criteria and used equally for the admissions decisions made for both white and Asian applicants.

ANALYSIS AND CONCLUSIONS

No violation

As to all but nine programs OCR found that the preponderance of the evidence did not support a violation of Title VI. OCR found that equally qualified Asian and white applicants were treated the same. This conclusion in some instances was based primarily on statistical analysis. However, in many cases it was based on a review of applicant files and a determination that the program either adhered to its articulated nondiscriminatory criteria or deviated from these criteria on an equal basis, without regard to race.

Insufficient data

For eight programs there was insufficient data available to OCR to explain, based on the program's stated criteria, the admissions decisions of the program. As to these programs, OCR is making no finding and is requiring additional record-keeping concerning future admissions decisions. OCR will monitor these programs annually for the next three years and will determine whether these programs have made their admissions decisions in compliance with Title VI. The programs included under these requirements are:

The M.B.A. program of the Anderson School of Management;

The Artificial Intelligence program of the Computer Science Department;

The Programming Languages and Systems (Software Systems) program of the Computer Science Department;

The Circuits and Signal Processing program of the Electrical Engineering Department;

The Philosophy Department;

The Biological Chemistry Department;

The Health Services Administration program of the School of Public Health; and

The Masters of Architecture I program of the Architecture and Urban Design Department.

The details about each of these departments vary widely. In general, the differences in admission rates of Asian and white applicants in each of these programs were not explained by the information provided by UCLA. On the other hand, information available on the admission decisions of these departments was insufficient to indicate that Asian applicants were treated differently than white applicants. Therefore OCR was unable to reach a conclusion as to compliance with Title VI. Because of these circumstances, under 34 C.F.R. § 100.6(b), in general, the eight programs will be required to maintain data concerning applicants for admissions for the Fall of 1991 through 1993 as follows:

Prior to the beginning of each admissions season, the program will state in writing its admission criteria.

As to each U.S. citizen or permanent resident alien submitting a complete application, the program will list the name (or

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other identifiers) race national origin, sex undergraduate GPA Graduate Record [illegible] years if used) undergraduate institution and whether the person was of [illegible] status.

As to each person denied admission, the [illegible] state the reason the applicant [illegible]

An admitted person admitted on a basis inconsistent with the written program will state the [illegible] the applicant.

[illegible] maintain the complete [illegible] applicant for admission review process is complete.

Discussion

[illegible] statistics provided by the [illegible] OCR found that [illegible] between the rates at [illegible] were admitted into [illegible] program when compared [illegible] applicants in 1987 and [illegible] were admitted at [illegible] and the differences in rates [illegible] significant for both years. [illegible] significant disparities, a [illegible] conducted to determine [illegible] for these differences in [illegible] were due to discrimination.

[illegible] Department's five point [illegible] was qualified 2 = [illegible] for review several [illegible] applications for the [illegible] OCR could not dispute [illegible] the admissions [illegible] that the Department [illegible] stated admissions [illegible] in making its [illegible]

[illegible] the Mathematics [illegible] in the initial [illegible] when deciding [illegible] to be admitted [illegible] often to the [illegible] applicants. As explained [illegible] Mathematics [illegible] a score on [illegible] of an applicant should [illegible] program. In 1987, [illegible] were accepted with [illegible] three of the Asian applicants [illegible] rated between 2.9 [illegible] a total of six Asian applicants [illegible] the same as or better than the lowest rated of the admitted white applicants. For Fall 1988, six white applicants were accepted with less than a 3.0, while one Asian applicant was accepted with less than a 3.0. OCR found that out of 112 white applicants, 5 were denied admission with a 3.0 or above and 6 out of 27 Asian applicants similarly were denied admission. Thus the deviation from the stated rating system appeared to disadvantaged Asian applicants more frequently than white applicants.

At this stage in the investigation of the Mathematics Department, the evidence showed a statistically significant disparity in the rates of admission on the basis of race, an apparent inconsistency as to how Asian and white applicants who received the same evaluation ratings were treated and insufficient information to suggest a nondiscriminatory basis for this apparent pattern. Therefore we sought to obtain more information from the Department that might dispel the discriminatory implications of the information collected by OCR. We submitted the names of 24 white applicants and 13 Asians for further explanation by the Department. Most of the white applicants had been accepted for admission to the Department. Most of the Asian applicants had been denied admission. These 39 persons had received ratings within the same general range.

In response to a request for an explanation concerning 39 of its admissions decisions for Fall 1988 and 1987, the written statement prepared by the Department provided reasons for 34 of the decisions.* The reasons provided by the Department explained these decisions based on the application of the Department's stated criteria. However, for several cases, the Department provided explanations for its decisions that took into account factors that did not appear in the admissions criteria as explained by the Department to OCR up to that point in the investigation. Two of the main reasons provided by the Department to explain the admission decisions were related to financial support. One reason specifically concerned the ability of an applicant to support her/himself through graduate school and the other concerned the state residency status of an applicant.

After reviewing the rationale provided by the Mathematics Department for its treatment of the 34 applicants, OCR was convinced that the justification for some persons was nondiscriminatory. But, as to Asians as a class, the rationale was not sufficient to dispel the discriminatory implication of the previously identified statistical pattern and examples of inconsistent treatment. The Department's rationale was not sufficient because some of the criteria used appeared to be developed after the admissions decisions were made, were not internally consistent or logical, and were not applied evenly to Asian and white applicants. Most significantly, the two factors cited by the Department (support and state of residence) appeared to be used only as a boost for white applicants and not for Asians. Thus several Asians who were California residents were denied admission even though they were as qualified as admitted white applicants.

In a meeting of September 11, 1990, the Department repudiated its own written rationale for the 34 admissions decisions and provided what was to a significant degree a new rationale which expanded the admissions criteria initially submitted by the Department. At the meeting, UCLA asserted that the Vice-Chair of the Department made the decision to admit or reject an applicant independent of the evaluations of his colleagues and that the Department preferred individuals who stated an interest in applied mathematics as it was easier to obtain financial support for such persons. Several of the additional factors explained to OCR were that applicants to the statistics program were admitted under entirely separate criteria, that females received a limited "boost," that the standards for admitting Masters applicants were lower than the standards for Ph.D candidates, and that persons employed by certain local defense contractors were admitted almost automatically.

OCR found that within the admissions process there was a critical area where the greatest degree of discretion existed. This area was defined by students who received evaluation scores somewhat above or below 3.0. It was in this area that certain special factors such as field of interest and gender had their greatest effect. However, our examination of the files revealed that these factors were not evenly applied on the basis of race. For example, there were multiple instances of white females within this critical area receiving a gender-based boost. However, similarly-situated Asian females did not receive the same degree of enhancement. Another example concerns the degree to which a stated interest in applied mathematics enhanced an applicant's competitive position. White applicants interested in applied mathematics with evaluation scores as low as 2.63 were admitted, in effect jumping over many more qualified whites and Asians. However, an Asian interested in applied mathematics with a comparable evaluation score was not similar advanced.

OCR determined that the Mathematics Department deviated from its originally articulated process. Thus, not all the admissions decisions made by the Department were explained by the Department's initial description. OCR further determined that the deviation appeared to be race-related. The Department provided second and third sets of rationales to explain an apparent inequity in the treatment of Asian and white applicants. The second rationale was abandoned. The third rationale was not adequate to fully explain all the apparent inequities. Accepting this rationale as the basis for the Mathematics Department's decision, OCR has identified five rejected Asian applicants who, if provided equal treatment, should have been accepted. Therefore, OCR finds that UCLA has discriminated against Asian applicants in violation of Title VI of the Civil Rights Act of 1964.

VOLUNTARY COMPLIANCE

During the week of September 10, 1990, I communicated with the Vice Chancellor for Student Affairs, Winston C. Doby, concerning voluntary resolution of this matter. He was advised of OCR's anticipated findings as well as proposed terms of settlement. During the week of September 17, Vice Chancellor Doby explained to me that UCLA would not enter into a voluntary compliance agreement of the nature proposed by OCR. Therefore, this matter remains unresolved.

OCR ENFORCEMENT AUTHORITY

OCR is required by Title VI to resolve this matter promptly. OCR remains prepared to discuss with UCLA any proposals for remedial action in this matter. However, if a voluntary settlement agreement cannot be reached in the very near future, it is my obligation to recommend to the Assistant Secretary for Civil Rights that an enforcement proceeding be commenced.

OCR wishes to advise you that when violations of Title VI are established, the implementing regulation authorizes this agency to seek an order terminating the Federal financial assistance received by UCLA or to obtain compliance through "other means authorized by law," which include possible referral of the matter to the U.S. Department of Justice.

The procedures employed for a termination of Federal financial assistance are described in 34 C.F.R. §§ 100.8–.11 and 34 C.F.R. Part 101. In general, the laws call for notice and an administrative hearing with certain appeal rights, including judicial review, as provided for in Section 603 of the Civil Rights Act of 1964.

This Letter of Findings is not intended nor should it be construed to cover any issues of compliance with Title VI that may exist but are not specifically discussed herein. Under the Freedom of Information Act, it may be necessary to release this document and related correspondence and records upon request. In the event OCR receives such a request, it will protect, to the extent provided by law, other personal information which, if released, would constitute an unwarranted invasion of privacy.

If you have any questions regarding these findings, please contact me at (415) 556-7000.

Sincerely,

JOHN E. PALOMINO,
Regional Civil Rights Director.

* At the time of the reply, the files of three Asian applicants were missing. These files were subsequently located. One Asian and one white applicant proved inappropriate for consideration. The Asian was a foreign student. The white candidate was in fact, Hispanic.

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DISCRIMINATION IN COLLEGE ADMISSIONS MUST STOP

HON. DANA ROHRABACHER
OF CALIFORNIA
IN THE HOUSE OF REPRESENTATIVES

Thursday, February 20, 1992

Mr. ROHRABACHER. Mr. Speaker, earlier today I discussed the significant implications of the U.S. Circuit Court of Appeals for the Fourth Circuit in Podberesky versus Kirwan on racial quota admission policies of colleges and universities. I also spoke about the finding by the Office for Civil Rights [OCR] at the U.S. Department of Education that Asian-American applicants to the graduate math program at UCLA had been discriminated against. I also discussed the delays that have occurred in four other OCR investigations of complaints of this type of discrimination at other units of the University of California system.

This is very dry, but important, legalism. It is important because it has a very human face. I mean the heartbreaking stories of those students who work hard for many years, who achieve high marks, high test scores, and accomplish many successes in extra curricular activities, but who are denied admission to schools for which they are highly qualified, and see students from the same high schools who have lesser records admitted instead.

The San Diego Union of February 10, 1992, tells the story of one of these students, Jennifer Riel, a Filipino American, who was valedictorian at Sweetwater Union High School in Chula Vista, CA. Jennifer Riel had a better than perfect grade point average due to honors courses and was captain of the cheerleading squad and still didn't get accepted to UC-Berkeley.

Mr. Speaker, what more does one have to do. What does such a rejection say to other students who work hard. How can any parent say to their children with a straight face "Work hard, get good marks and you will get ahead." I ask unanimous consent to insert at this point in the RECORD the San Diego Union article that tells the heart breaking story of Jennifer Riel.

Mr. Speaker, discrimination in college admissions must stop.

A good start would be for the House of Representatives to pass my legislation House Concurrent Resolution 102. It should be added as an amendment to the Higher Education Act reauthorization bill which the House will consider later this year.

(From the San Diego Union-Tribune, Feb. 10, 1992)

UC GETTING FEW POINTS FOR CRITICIZED ADMISSIONS POLICY

(By Steve Schmidt)

Captain of the cheerleader squad, class valedictorian, bigwig in student government—all were achievements in the halcyon days of Jennifer Riel's senior year.

It was the spring of 1991 and, by nearly everyone's account, the Chula Vista girl was enjoying a stellar season at Sweetwater Union High School.

Then she opened her mail.

Neatly folded in a thin envelope was a terse letter from UC Berkeley, telling the Filipino-American that the prestigious university had rejected her application to enroll.

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"They said I had to be a well-rounded student," Riel recalled. "Well, what else could I do? I had done just about everything there was to do in high school."

Berkeley accepted at least five other Sweetwater students—all with excellent academic credentials, but none better than Riel's.

The other students happened to be members of underrepresented minorities that Berkeley wanted to woo to campus. Riel was not.

Riel's unexpected rejection—coming as her peers were welcomed—put her in a cross-fire of a growing national debate over the college admissions process.

As families await word in coming weeks on whether their sons and daughters will be accepted into college next fall, educators and others agree that hostility is growing over who gets in and who doesn't.

Affirmative action programs—long a flash point in the nation's struggle over race relations—are again drawing much of the fire.

Simmering resentment among some whites and Asians over such programs, along with the slew of headaches facing higher education administrators, are putting the pinch on efforts to bring more minorities to big-name universities.

The debate over admissions is particularly sharp on the nine highly regarded University of California campuses, including Berkeley, UCLA and UCSD.

"It's been most dramatically seen in the UC," said Robert Atwell, president of the American Council on Education.

Next fall, UC San Diego expects to hit a milestone. The entering freshman class will likely be the first in which whites are not a majority.

But first the campus has some questions to answer. Prompted by allegations of racial bias, the U.S. Department of Education is conducting an investigation into admissions practices on the La Jolla campus. A report is expected in a few weeks.

UCSD administrators defend their admissions policies, calling them fair to all applicants.

"After the civil rights movement of the 1960s, there was a sense that for the sake of society we have to try to integrate," said Patrick Hayashi, an associate vice chancellor at Berkeley.

"Now, I think the American public is re-examining the shape that commitment is taking," he said.

In several dog-eared boxes, scattered next to an office water cooler and a Toshiba microwave, sit the makings of controversy.

Box by box, file by file, page by page, a handful of UCSD campus evaluators carefully scrutinize freshman applications for next fall—all 19,000 of them.

More than half the applicants will be offered the chance to enroll when acceptance and rejection letters are sent starting March 9.

In the cases of many applicants, it's not a tough choice.

Most applicants' combined grade-point averages and test scores are so high—or so low—that their acceptance or rejection usually is not in question. Sixty percent of the students who enroll at UCSD are selected solely on academic credentials.

Then there's everyone else.

For students in the middle, test scores and grades are calculated as well, but additional points are assigned that could determine whether UCSD has a spot for them. Are they disabled? That's worth one point. A veteran? One point. Poor? Three points. An underrepresented minority? Three points.

This, university officials say, is one way to right some of the nation's wrongs by allowing minority advancement in largely well-heeled and white institutions.

U.S. Rep. Dana Rohrabacher, R-Los Angeles, bristles at such talk, saying the point system and admissions practices at the UC campuses amount to racial quotas.

"I think it's totally absurd," he said. "What we're seeing here is a bastardization of the whole concept of affirmative action."

In October, Rohrabacher got federal education officials to investigate allegations that UCSD discriminated against a handful of Filipino-Americans who were not admitted last fall.

Because Filipino-Americans and other Asians no longer are considered underrepresented on campus, they are not assisted by affirmative action programs.

John Bunzel, former president of San Jose State University and a former member of the U.S. Civil Rights Commission, believes affirmative action is too entrenched in admissions.

"I have long felt that women and minorities were not in the loop," he said. But, he added, "it's not right to diversify by simply playing the numbers game."

Point systems and other strategies to woo minorities often results in cockeyed trade-offs, critics like Bunzel and others argue.

Should a top-flight Hispanic student from a rich family be admitted but not a poor white student with similar grades? If American Indians continue to get special consideration in admissions, why shouldn't impoverished immigrants form Southeast Asia?

"It's not a science," said UCSD admissions director Ronald Brewer.

Even some longtime supporters of affirmative action agree that it has been unevenly applied at times.

"To be sure, it has lumbered and creaked. It has worked slowly and incompletely," New Jersey professor Catharine Stimpson wrote in a recent issue of The Chronicle of Higher Education, an influential academic journal.

But, she wrote, "the important reality is this: affirmative action has worked."

Minority attendance at colleges nationwide rose during the last half of the 1980s largely due to aggressive recruitment, according to the American Council on Education.

From 1988 to 1990, the percentage of black students grew 0.2 percent, while Hispanics posted an 11.5 percent increase.

The figures are less encouraging within the UC system, where the number of black and Hispanic undergraduates has seen little gain in recent years.

The Latino population at UCSD has grown from 9.1 percent of the undergraduates in 1988 to 7.5 percent today. The percentage of blacks has actually slipped—from 2.9 percent to 2.6 percent.

UC administrators, frustrated by the numbers, have stepped up recruitment drives in recent years at high schools and community colleges.

High school dropout rates remain high among Hispanics and blacks. In addition, only a small percentage of those who do graduate meet UC eligibility standards.

Under state mandate, only the top 12.5 percent of California's high school graduates are eligible for UC admission.

Rather than fiddling with points and other ways to beef up minority representation, critics of affirmative action say educators should instead try to improve high school graduation rates.

With many Asians, it's another story. The percentage of Asians has grown so high that UCSD and other campuses no longer consider them underrepresented.

Largely because of the rise in Asians, the freshman class at UCSD entering next fall is expected to be the first in which whites are not a majority.

In recent years, both UCLA and UC Berkeley have modified their policies to ease concerns over admission limits that some viewed as having an anti-Asian bias.

Now with the federal investigation, UCSD is in the hot seat.

Joseph Watson, UCSD vice chancellor for undergraduate affairs, said the campus has done nothing wrong, despite assertions by Congressman Rohrabacher that the university's affirmative action policies have hurt both Asians and whites.

The conservative congressman demanded the federal investigation after reading a newspaper account regarding several Filipino applicants.

Watson said Rohrbacher made no attempt to contact the campus before calling for the probe, giving the impression that his demand was politically driven.

In recent months, the Bush administration has called into question the use of minority scholarships and whether private accrediting agencies should continue to look at campus affirmative action policies.

"That all sends a very discouraging message that has a chilling affect on affirmative action," said American Council on Education President Atwell.

Those moves—timed with the recession, budget cuts in education and skyrocketing student fees—have fed the backlash against affirmative action, educators say.

Said Watson: "As families feel more under the financial gun, more anxious about their futures . . . there's going to be more tension with this."

Jennifer Riel said that when she was a young girl, her immigrant parents encouraged her "to work very hard and to attain what they couldn't."

Last year, she graduated valedictorian at Sweetwater Union High School. Her grade-point average was a better than perfect at 4.5 because of several honors courses.

Then came word from Berkeley.

Administrators told her she had applied for the most competitive major on campus—bioengineering.

"Our denial of Riel's application for admission is not a negative reflection on her achievement," a campus official wrote at the time. "It is entirely a reflection of our inability to accommodate the extraordinary demand for places at Berkeley."

Riel wanted to change her major on her application but was not allowed to under Berkeley policy.

Today, she attends Loyola Marymount University in Los Angeles. She said she is not happy there and is considering applying to UBC.

Meanwhile, in thousands of San Diego households—from the city's hilltop spreads to its poorest neighborhoods—the wait is on.

Families are starting to get letters from campuses nationwide telling them whether their children made it into their college of choice.

Serra High School senior Tracy Ward has her sights on Duke University in North Carolina. Ward, who has a 4.6 grade-point average, has also applied to three UC campuses.

But, she explained, "being white and middle-class, it doesn't make me stand out at all."

Still, she has no qualms about affirmative action. "I've had all the opportunities I could want," she said. "So many people don't get those."

Aaron Glynn of Bonita Vista High School in Chula Vista is hoping to get accepted into a college in Colorado.

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The 17 year-old senior believes affirmative action has "gone a little too far."

But Glynn himself may benefit from a type of affirmative action as well. Glynn said he has applied to a campus that gives special consideration to those with his sort of handicap: dyslexia.

"I should get a little break to get in," he said.

ETHNIC DISTRIBUTION OF FIRST-TIME FRESHMEN AT DCSD—1988 AND 1991

Over the last few years, DCSD has become increasingly diverse. In 1988, whites represented 61% of the freshmen class; today they represent 51%. The largest proportional enrollment gain is among Asian-Americans who represented 15% of the freshman class in 1988 and 23% in 1991.

	Percent
1988:	
Native American	0.3
Latino	3.6
African-American	3.4
Chicano	5.4
Filipino	5.7
Other	6.7
Asian	15.1
White	60.8
1991:	
Native American	1.3
Latino	1.3
African-American	2.4
Filipino	3.3
Chicano	9.0
Other	9.1
Asian	23.7
White	50.6

Source: DCSD.

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Opening Remarks
Hearing on the President's Strategy
for Improving Mathematics and
Science Education
Congressman Dick Swett
New Hampshire, Second District

Thank you, Mr Chairman. I want to commend the Chairmen for organizing this hearing and assembling such a qualified and distinguished panel of witnesses. I am looking forward to hearing their testimony.

We are all disappointed and alarmed with the results of recent studies detailing the poor state of science and mathematics education in the United States and the correspondingly low scores of American students on international examinations. Yet, I am sure that, working together, we can identify ways in which we can help American children to once again become the premier math and science students in the world.

Many problems exist with our current educational system. Recently, in the International Assessment of Educational Progress's examination of students in 20 countries, American 13 year-olds consistently scored below their international counterparts. In mathematics, our students tested below average, far behind countries such as Korea, Taiwan, France, and the Soviet Union. In science, our students scored at the IAEP average, but still lower than many of our international competitors. Furthermore, the problem will not resolve itself. According to a recent report by the Committee on Education and Human Resources of the Federal

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Coordinating Council for Science, Engineering, and Technology, the number of qualified teachers entering the educational system has dropped by over 50% in the past two decades, and we are currently losing 13 math and science teachers for every one that joins the profession. Also, very few elementary school teachers, those that are best able to influence our children in the early formative years, are trained to teach science. As a result of these numerous problems, only 5% of high school seniors demonstrate the basic level of preparedness required to pursue studies in advanced mathematics. Japan, a country with only one-half of our population, annually trains nearly as many engineers as we do.

Unfortunately, the solutions are not as evident as the problems. Effective solutions will require new ideas and new approaches to learning. They will involve the coordinated participation of students, teachers, parents, business leaders, and public officials. Solving these problems calls for a fundamental reexamination of our educational system and a renewed commitment to provide our students with the education and resources necessary to successfully compete in today's global economy.

Many of us remember that day in October of 1957 when we were startled by the news that the Soviet Union had sent the first spacecraft into orbit. Sputnik woke up this nation and reminded us that we could not rest on our laurels -- that if we were to remain players in the international arena, we had to excel in the realm of education. We had to work, not only with our hands, but

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also with our minds.

Looking back, Sputnik was a blessing in disguise, for it created the political will to do what was necessary to make up lost ground in the race for the moon. It emphasized that the quality of our educational system is a critical component of our national competitiveness.

It is my hope that the recent examples of bad news regarding our educational system will not cause us to throw up our hands in frustration and despair, but rather, as with Sputnik in 1957, inspire us to roll up our shirtsleeves and work together to solve the difficult problems that face us.

Today, the stakes are higher than winning the race to space and placing a symbolic flag on the moon. The future international position and economic competitiveness of this country depends on how successfully we resolve these problems now. I look forward to hearing the ideas and proposals of our witnesses today, and I hope these discussions will prove to be fruitful in developing effective solutions to this nation's educational problems.

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REPRESENTATIVE THOMAS C. SAWYER

Mr. Chairman. I want to thank you for holding this imporant hearing this morning. I hope it is the first of many more collaborative efforts on the part of our two Committees.

I take it as a good sign that we have before us today these four individuals who, among them, have the tools to change the direction of math and science instruction in this nation.

The people of this country do not hear or understand the language of math and science—much less speak it fluently. This is going to require a sea change in the way we teach math and science and the way we learn it.

Unfortunately, it has been my observation that federal agencies of this country, including the two relevant Committees of this House, have not done nearly as much together as we might have to contribute to the goal that we will be first in math and science by the year 2000. Having said that, I am greatly pleased by the fact that the Department of Education—with no little prompting by Congress—has decided to give the Eisenhower Math and Science Program the attention it deserves. This is the program that is best known among classroom teachers, and in my view has continuing promise, not yet fully realized.

The National Science Foundation, too, has done fine work in advancing the state of math and science learning.

We still have a situation, however, where one hand does not necessarily know what the other is doing or, some say, agree that what the other hand is doing is terribly useful.

I sense by your presence here this morning, gentlemen, that all this is a thing of the distant past. I thank all of you for your commitment and look forward to your remarks.

Chairman FORD. Mr. Gilchrist.

Mr. GILCHRIST. Thank you, Mr. Chairman. I have to leave at 10:00 a.m. for a markup, but as a schoolteacher, I feel compelled to say just one very quick thing.

One of the most important places in our whole structure for math and science is the classroom, where the teacher teaches the student. I know learning takes place at home and that a sense of curiosity for this world is engendered in the minds at a very young age.

We talk about elemenary school teachers that don't get quite enough math; middle school teachers, or public school, senior high school teachers. If in some way the Federal role could be to ensure that on a regular basis—every year or every other year—the schoolteachers from every public school—kindergarten through the 12th grade—have the opportunity to receive the latest advances in science or math or history in a local community college or a local university or college, they would get the tools, the information, the sophistication, thereby having the motivation for another year or two to present this information to those kids.

It's very difficult for your average schoolteacher—I know; I was one up until last year--to go out and find this broad range of material and this broad range of information. Quite often it happens accidentally. As a history teacher, I ran across a diary from a sailor on Magellan's ship around the world. Now, that was quite by accident. Thereafter, when I taught that period of history to those kids, they became enthusiastic.

The Federal Government can take leadership to ensure that there are seminars—I know we could do this if it was done in the right way—to give those individual schoolteachers the skills and up-to-date information on math methodology, the latest in science and technology and social sciences and English, so that they could

give this thrust to improving the quality of education and a motivation for our students.

Thank you, Mr. Chairman.

Chairman FORD. Mr. Swett.

Mr. SWETT. Mr. Chairman, does being a member of both the Education and Science, Space and Technology Committee get you anything?

Chairman FORD [inaudible]. The witness list that was prepared for me by the staff has Mr. Bromley leading off, followed by Mr. Truly, Mr. Massey, and Secretary Alexander. If that's suitable to the panel, we will proceed in that fashion.

Without objection, any prepared statements, that you have, and any additional materials will be inserted in the record immediately following your oral comments as we proceed in the order I've just announced.

Mr. Bromley first.

STATEMENT OF HON. D. ALLAN BROMLEY, DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY, EXECUTIVE OFFICE OF THE PRESIDENT

Dr. BROMLEY. Chairman Ford, Chairman Brown, Mr. Goodling, Mr. Walker, members of the committees, my colleagues and I are delighted to be here this morning to present to you the President's strategy for strengthening American mathematics and science education.

As Chairman of the Federal Coordinating Council for Science, Engineering, and Technology, I want to pay particular tribute, and thank you in particular, for giving us this unique opportunity to present to the two committees simultaneously rather than on an agency-by-agency basis. This, I believe, I recognize, has required additional effort on your part, and I simply wanted to say that, on behalf of all of us, we deeply appreciate it.

When I first became Director of the Office of Science and Technology Policy, one of my first acts, with strong support from the President, was to revitalize and reorganize the Federal Coordinating Council. We established seven committees, with broad mandates for coverage of all areas of science and technology. One of those committees is the Committee on Education and Human Resources, which has been chaired by Admiral James Watkins, Secretary of the Department of Energy, and I would have to say that Chairman Watkins and his committee have done a truly remarkable job in this past two years.

Last year, in preparing for the fiscal 1992 budget submission, they identified for the first time all of the large number of Federal programs directed at mathematics and science education and pulled them together into a unified, cohesive, interagency strategy, attempting to address the question that Mr. Goodling raised in his opening remarks.

This year, in preparing for the 1993 budget, we have built on this pioneering achievement to further develop our understanding of how the Federal Government can contribute to meeting the national education goals for mathematics, for science education. And before presenting a very brief overview of the committee's propos-

al, I would like to summarize, if I might, the way we would like to proceed.

After I finish my remarks, then Admiral Truly will make his comments, then Director Massey from the National Science Foundation, then Secretary of Education Lamar Alexander. We want to discuss the major roles that are being played by a number of the agencies in making possible this coordinated, integrated, national program to achieve what are, by any measure, ambitious goals for mathematics and science education in this particular country.

Now, as part of its work, the Committee on Education and Human Resources has developed strategic objectives and priorities for the Federal effort in math and science education. Highest priority, not surprisingly, has been given to pre-college education. Undergraduate education has received the second highest priority, and I would be remiss if I did not emphasize, however, that graduate education, that has been one of the very bright spots in the whole educational arena, one of the areas where we have unquestioned international leadership, is an area that we must focus upon as we move forward. As we attempt to fix other parts of our educational enterprise, we cannot afford to let the leadership that we have in graduate education slip.

For fiscal 1993, the President is requesting a total of $2.1 billion for improving mathematics and science education across all educational levels. This represents, as the Chairman has stated earlier, a 7 percent increase over the 1992 enacted levels for these programs, and a 43 percent increase over the fiscal year 1990 enacted levels.

I should point out that these figures are just for those programs legislatively established or specifically administered for mathematics and science education. Not included in these figures—and this, I believe, is important—are the large amounts provided through formula awards, such as the Department of Education's Title I programs, or the funds used to support graduate students that are provided through research grants to university faculty across the Nation.

The most notable increase has been for elementary and secondary education, and that has grown by 123 percent between fiscal year 1990 and the fiscal year 1993 request. The President is requesting $768 million for elementary and secondary education in fiscal 1993, an increase of 18 percent. The President is also requesting $481 million for undergraduate education, $750 million for graduate education, and $93 million to work toward improved public scientific literacy.

Now, to close, it is important to remember—and we sometimes neglect to emphasize—that improvements in mathematics and science education simply cannot take place in isolation. Such improvements must inevitably be part of a much more extensive reform of our entire pre-college educational system. We have problems in mathematics and science education, but the problems are not restricted to those fields.

To provide the broader context within which improvements in mathematics and science education must take place, and to show you the full benefits of interagency coordination in this area, I would now, with your permission, Chairman Ford and Chairman Brown, turn to my colleagues, who will provide you with greater

detail. I want to take the occasion to compliment them and their colleagues in all the agencies who have demonstrated what is really an unprecedented level of cooperation in bringing together a coordinated national effort that we can present to you this morning.

So again, thank you. I would then turn over to my colleagues.

Chairman FORD. Thank you.

Admiral Truly.

STATEMENT OF HON. RICHARD TRULY, ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Admiral TRULY. Chairman Ford, Chairman Brown, Mr. Goodling, Mr. Walker, and all the members of the committee, I'm delighted to be here this morning, and I would like to express my appreciation for the two committees to provide us an opportunity to talk about what I believe is one of the most important and vital issues of our Nation today, and that is the education of our children in mathematics and science.

I must tell you that I have been a very admiring and as highly supportive as I could have been in the last three years as the Administrator of NASA to Dr. Allan Bromley and his leadership of the FCCSET Committee and the organization of it. Through his efforts in FCCSET, the various agencies have been able to come together and identify long-term strategies and mechanisms and establish those to facilitate and coordinate the Government investment in mathematics and science education to support America 2000, the National Education Goals, and particularly the work of Admiral Watkins and the FCCSET Committee on Education and Human Resources over the last two years, which has played an extremely important part.

NASA is an example of a mission agency playing a pivotal role in mathematics and science education. We provide real world experience and excitement to students, and we spend a lot of our efforts in enhancing teacher skills across our Nation. As you know, NASA's business is space flight and aeronautics research. The tools of our business are high-performance computing, supercomputers, systems engineering, computational fluid dynamics, development of new materials and engines, and our country being first in mathematics and science is critical to agencies like NASA. In turn, we are critical to the Nation's competitiveness, leadership, and economic prosperity.

We in NASA have also found that U.S. universities are world renowned for quality education, a position that we should foster in other elements of our educational system. The longer that I have worked with NASA's contribution to education, I have insisted and our people have discovered that we in NASA must concentrate each year on younger and younger students and their teachers. I have long had a personal commitment to education—the arts, literature, geography—but mathematics and science education is my passion. I have often said that mathematics is the poetry of space flight.

In the last couple of weeks we celebrated in this country National Engineers Week, and many around the Nation celebrated it by

going into classrooms, and even though we're not teachers, by teaching classes. I did that here in an inner D.C. school and taught a sixth grade science class. At my urging, over a thousand NASA engineers, everywhere from Cape Canaveral to Palo Alto, also went into local schools and taught.

When I went into this classroom, I found an excellent teacher, a committed principal of the school, and very prepared students. But in the weeks since I had that wonderful experience—and it was, and I've been thinking about it—the classroom essentially is untouched fundamentally by technology. It is not unlike the classroom that I went to a sixth grade class in south Mississippi in the 1940's. I believe that is a major opportunity that can be seized upon and possibly used as we strive to be number one.

The education of America's boys and girls must be America's passion today. The schoolhouse door is literally the doorway to the 21st century. Education is and is not about numbers. The numbers are too dry and too impersonal. Education is about touching the future today. It is about work instead of welfare. It is about hope instead of despair, and it is about doing rather than watching.

In summary, my personal belief is that this country needs and must have a well-educated, highly skilled, experienced, culturally-diverse and extremely motivated work force. I believe that NASA's programs and our field centers across the country can join with other mission agencies, under the leadership of the FCCSET and of America 2000, to be of particular importance in exciting students and putting additional tools in the hands of schoolteachers.

America's space program is not a jobs program, but the space program is about jobs. They are some of America's best jobs, scientists, engineers and technicians, jobs that build communities. But they are jobs that require a sound foundation in mathematics and in science. I believe two of the most important things going on in the Federal Government today is the interagency cooperation over the last couple of years as a part of the FCCSET efforts, and also the integration of agency efforts as we support America 2000.

Thank you, Mr. Chairman.

Chairman FORD. Thank you.

Mr. Massey.

STATEMENT OF HON. WALTER MASSEY, DIRECTOR, NATIONAL SCIENCE FOUNDATION

Dr. MASSEY. Thank you very much, Mr. Chairman.

Chairman Ford, Chairman Brown, Mr. Goodling, Mr. Walker, and members of both committees, Science, Space, and Technology and Education and Labor: Like my colleagues, I am exceptionally pleased to be here today to discuss the Federal role in reforming science and math education.

We have set for ourselves a very ambitious goal. That goal is to make United States students first in achievement in these fields by the year 2000. I am confident that our efforts in science and math to help the broader agenda of America 2000 will be successful. As Mr. Brown said, this is an ambitious goal and we should keep it in front of us to stimulate all of the efforts that we are putting into these activities.

My confidence, in part, results from a proactive community that has already developed many activities that move us towards this goal. Math standards have been prepared by the math community, and the science community is preparing to carry that model to the sciences. It is also very much due—my confidence, that is—to the process of the FCCSET activity and the cooperation that I see developing and in many areas already consummated between our various agencies.

As Dr. Bromley said, this 1993 FCCSET Committee on Education and Human Resources has a very ambitious budget—over $2 billion—which will continue to focus on improving pre-college education. A major emphasis in that area is to strengthen the competency of the 1.7 million teacher work force in our Nation.

Following closely upon teacher enhancement will be activities to update and improve our curricular materials. Being a product of Southern Mississippi in the Forties, as my colleague Admiral Truly is, I can also attest that in many places there has been very little improvement over the kind of schools we attended in their use of modern technology.

The FCCSET educational initiative is paying increased attention also to the Nation's higher education enterprise. Curriculum reform at the undergraduate level, especially in introductory courses, must be attuned to ongoing changes at the pre-college level. A critical part of this effort is to strengthen the natural links between teaching and research.

We are also planning to monitor carefully trends at the graduate level, as Dr. Bromley has pointed out, where the U.S. remains strong, but it's an area where we cannot become complacent.

The educational strategy at the National Science Foundation fits well within the FCCSET education initiative. Our programs broadly support all fields and all education levels. Our goal is to ensure high-quality education for every child, to spark interest and nurture talent, so that those who are inclined can pursue scientific and technical careers. And for those who do not go on to careers in the sciences, we must make certain that they have the tools needed to make informed decisions about scientific developments throughout their lives.

We now have a comprehensive and integrated set of programs that address the needs of groups traditionally under-represented in science and technology—minorities, women, and persons with disabilities. Furthermore, a commitment to human resources development underlies all of the activities at the National Science Foundation.

Over the last decade at the Foundation, we have developed a new generation of education and human resource programs. In the brief opening statements, I cannot do justice to the excitement generated by our rapidly expanding agenda and the new approach we are taking to systemic reform. This is the method we are now pursuing. I can assure you, however, that we are meeting the education challenge with, I believe, renewed expertise, unparalleled dedication, and creativity. I would like to just mention a couple of examples.

In the area of teacher enhancement, we are providing a strong base to the proposed FCCSET education initiative by providing in-

tensive training to over 25,000 teachers annually, which fits in with Mr. Gilchrist's remarks. We are training leader teachers to train their colleagues and strengthening the work force in entire districts and entire school systems. A project in Baltimore, MD, for example, will train 2,000 teachers to implement a new science curriculum in 124 elementary schools.

Just one other example. The NSF's Statewide Systemic Initiative Program I think is one of the most far-reaching programs that we've initiated under the FCCSET process and at the Foundation. Its goal is to support science and math reform in entire States. This year, we will add 8 to 11 awards to the 10 awards we already made for 1992. If you can imagine, think of classrooms where all children are actively engaged in problem-solving, relating science and math to their lives, and also tapping into rich community resources such as zoos, museums, and laboratories of Federal agencies, as well as industrial labs.

A project in Louisiana typifies the potential of this program. It establishes an alliance of State players affecting educational policy, legislation, resources and practices, to strengthen all major aspects of the educational system. The program also seeks to improve teacher certification and expand the use of educational technologies in the classroom. This program will be implemented in about 750 classrooms in the first year alone.

We believe reform requires forging alliances and partnerships, as we are doing among our agencies, but also partnerships across all sectors who are interested in these activities—the private sector, the public sector, schools, as well as universities and industries.

One new program, Partnership for Minority Student Achievement, is targeted at school systems with significant minority populations. Our programs in this area will address the needs of underrepresented groups throughout the educational system and we will reach nearly 15,000 minority students and 2,000 educators in the following year.

I would like to close, Mr. Chairman, by just adding that the NSF is a full participant in the FCCSET process. We have undergone a reorganization in our own education and human resources activities to better match our internal resources and needs to the new challenges that we face.

One example of this increased cooperation between agencies is the recent signing of a Memorandum of Understanding between the Department of Education and the National Science Foundation to pursue focused activities in the areas where we can complement each other's programs.

Our investment strategy is also increasingly targeted and oriented towards accountability, also effectiveness, and being able to demonstrate in the years ahead that the resources that you in Congress and the Administration have provided us will be used effectively.

I will end there now and turn over the microphone to my colleague, Secretary Alexander. Thank you.

Chairman FORD. The Committee will stand in recess very shortly so that we can go over and vote and reassemble. Everybody wants to hear you, Mr. Secretary. They're waiting to get at you. [Laughter.]

[Whereupon, the committees were in recess.]

Chairman FORD. The committee will come to order.

The next presenter on the panel will be Secretary Lamar Alexander. You may proceed.

STATEMENT OF HON. LAMAR ALEXANDER, SECRETARY, DEPARTMENT OF EDUCATION

Mr. ALEXANDER. Mr. Chairman, Mr. Brown, Mr. Goodling, Mr. Walker, and all of the members, thank you for this opportunity. I'll try not to repeat what my colleagues have said, but try to focus my comments on these points, and then we'll be prepared to try to respond to questions or comments from the committee.

I believe the most important things I could say are, number one, to remind ourselves that we do have a problem. Our greatest obstacle in facing up to our educational responsibilities in America is that too many people say the Nation's at risk but I'm okay. The fact is, almost all of our children are at risk. That includes middle income and in the suburbs, from families who value education, who send their children to schools they think are good. Fundamentally, our children are not learning what they need to know and ought to be able to do about math and science, to live, work, and compete in the world the way it is today. It's that simple.

As was mentioned, last week out came studies about science and math and the comparison between our nine and thirteen year olds, and in math it showed we were just ahead of Slovenia and Jordan among a list of about 20 countries for nine and thirteen year olds. So we've got a problem. Governor Romer of Colorado said it was as if we show up at the Olympics with a bamboo pole prepared to jump 15 feet, and the rest of the world is using fiberglass and hitting 18 or 19 feet. It's just that simple.

Second, we believe all children can learn to world-class standards. We believe all children should be expected to learn to world-class standards. We know that virtually all can, and they must, and that it is elitist to say that some can and some cannot. That's a very important part of what we believe.

Third, we are against—against, not for—a single, made-in-Washington standardized, national examination. We're against that. Nobody in the Administration is proposing a single, standardized, made-in-Washington national examination in math or in science or in anything else. What we are for are national goals, which we have, world-class standards in math, science, as well as English, history and geography. We're for helping States develop those standards for themselves, helping them change their curriculum frameworks, helping them retrain their teachers so they can teach to those frameworks, and then we're for helping there be more than one achievement test available in math and in science and in English and in history and geography so that families and communities can tell whether their children and their schools are teaching and learning math and science, so that those children can learn, can live and work and compete with children who are growing up in Tokyo, in Seoul, in Hamburg, in Budapest and all the way around the world.

Finally, we are for investing in this ambitious goal to help make the United States first in the world in math and science.

This effort, that has been made mostly before I ever arrived on the scene by my colleagues, to assemble the $2.1 billion of Federal spending for math and science, is a very impressive effort. Admiral Watkins, who is not here, as Allan Bromley said, deserves a lot of the credit for that. That's the first thing we needed to do.

The Memorandum of Understanding between the National Science Foundation and the Department of Education has been described as historic, in terms of taking what we're already doing and focusing on what it ought to be doing. The work of the National Council on Standards and Testing, which Mr. Goodling and Mr. Kildee were members of, has been very important. Congress has been a player in helping moving along the idea of world-class standards and talking about a national examination system, or ensuring the development of one. And President Bush has asked Congress to increase spending for elementary and secondary math programs by 18 percent, to fund the idea of Governors' Academies for teachers of math and science in every State for teacher retraining, and has spent $25 million more on helping move along the idea of world-class standards, curriculum frameworks, and assessments to go with those.[1]

Let me see if I can put this in a more practical setting. I brought this cumbersome thing—this is a headlight. This is a headlight for a Saturn car. I checked this morning, and the Saturn automobile plant is one General Motors plant that is not only open but the employees are working overtime. By 89 percent, they voted to work 50 hours a week instead of 40 hours a week. They expect to do that all the rest of this year. They're at Springhill, TN, which is why I happen to know about them. The reason is that people want more of their cars than they can make.

Now, why is that? I can tell you one reason that is. It's because every employee, every UAW member who goes to work at the Saturn plant has to pass a headlight assembly team test. They don't send the headlights down from Detroit. They create them. They decide as a team how to put them together, and they want to make absolutely sure they're defect-free.

UAW team members told me they don't want anybody on their headlight assembly team who doesn't know mathematics, who doesn't know estimation, who doesn't understand spatial relationships, who doesn't know how to handle inventory control, who can't communicate—in other words, doesn't know English well—and who can't be a good team member. You didn't have to know that to work in an automobile plant 20 years ago. You do have to know it today to work at the Saturn plant.

The reason is they don't want a headlight with a defect in it, or somebody's going to buy a car made in Tokyo. What they're doing at the Saturn plant is making a car with a wheel on the right-hand side because they intend to sell these cars in Tokyo, and that's the basic reason why high standards in math and science are important for average families across this country. It's what you have to

[1] To spend $25 million more to help move along the idea of world class standards, curriculum frameworks, and assessments tied to these standards and frameworks.

know to get a job in an automobile plant or in most places in America.

Now, the two points I would like to especially focus on, very briefly, are the thing that comes up—some people say well, first, let's just put in a lot of money, and then we'll set these high standards, because it's not fair to at-risk kids to expect them to learn what everybody else learns. That couldn't be more wrong. That is exactly backwards.

When NASA said "Let's go to the moon", they didn't say "Let's just take a trip, give us a lot of money, and then we'll decide where we're going." They started by saying "Let's go to the moon." You start with the standards. You start with the goal.

Chet Atkins is a guitar player and philosopher from Tennessee, and he says in this life you have to be mighty careful where you aim because you're likely to get there. If we aim just above Slovenia and Jordan, that's exactly where we'll get. If we aim to be with Korea and Taiwan and first in the world in math and science, that is precisely where we will get.

The U.S. Army now requires you to have a high school education, almost everyone, to join the Army. They wouldn't think of sending anybody into the Persian Gulf last year without training. Sending a student into the work force today without knowing math and science to a world-class standard is approximately as big a favor as sending a soldier into the Persian Gulf without training. It is no favor to anybody. So standards are for everybody, not just for some people.

I remember listening to Jaime Escalante, the teacher from California. "You can do it, anybody can do it", he tells his kids. And 25 percent of all the kids with Hispanic surnames in the country, who are—25 percent of all the kids with Hispanic surnames in the country who score 3 or better on the advanced placement calculus test in this country are in his classes, and he only teaches poor kids, at-risk kids. "You can do it, anybody can do it." His classes are classes of 40 and 50. He teaches them five or six classes a day. He is exceptional, but the attitude is the important thing.

Some people who like the tests we now have have come in and suggested the idea of a national test is bad idea. Let me go to this second point. We're not for a national test. The only group in Washington that's ever been for one that I know is the United States Congress, which enacted one a few years ago and nobody's paid any attention to it. We'll be glad to do it if you'd like for us to do it. There's an 11th grade achievement test on the books. But we don't think that's the way to go.

We would prefer, we would prefer to move to support not a national curriculum but national standards. We would prefer to help States create their own curriculum. We would prefer to devote this $2.1 billion that this FCCSET Committee, my colleagues, have put together, to focus that on teacher retraining, and then we would like to encourage the development of examination systems which communities may choose to use, choose to use to see whether their children are succeeding.

We are not for more tests; we are for better tests. The tests we have today are principally tests like "Lake Woebegon". They tell us that our children are all above average. The international com-

parisons that we saw last week tell us that 90 percent of our children, more or less, are below average in what they know about math and science.

They're not below average in their brain power. They're not below average in their potential. They just aren't learning what they ought to know. The first thing you do is to come to a consensus about what there is to learn, what there is to know, and then you set about doing it.

So I am delighted, Mr. Chairman, that this committee, and these two committees, have given us a chance to come together and talk about how together we can reach this very ambitious goal by the year 2000.

We are not really asking the Congress to do anything new. This is already going on. The States are creating a world-class set of standards. The National Council of Teachers of Math has already finished its work on world-class math standards and are busy working with educators. Everywhere I go in America, I find teachers learning these standards and thinking about how to develop new examinations, new assessments, to learn about this.

I was in Baldair School in Fresno the other day and walked into a classroom, in an elementary school, and there all the kids were working with cows' eyeballs. They were dissecting them. You couldn't interrupt those children for a minute, they were so excited about the learning of science. They were explaining to me about how the lens work and why it was magnifying. They weren't a bit distracted, even by the presence of all the television cameras. The teachers had voted to take the money that would go for aides and use it to extend the school day for an hour a day to help those children learn more.

Those children, who are primarily from Hmong children, they're Cambodian-American children, they're Hispanic-American children, there's no doubt they can learn to these standards. All we have to decide is to do it. So if you will continue the work in support of the Council on Standards and Testing, which Mr. Kildee and Mr. Goodling served on, if you will support the President's request for an 18 percent increase in the Eisenhower math and science program, if you will encourage the Appropriations Committee to give us $25 million to help the States move ahead with world-class standards, I believe this is something in education we can all agree on. It is the fair thing to do for at-risk kids, and it is in the American tradition because it is not a single national exam. It is a set of goals, a set of standards, so that we can be first in the world by the year 2000, and it will be done in a decentralized way, a way which I think you and most Americans will approve.

Thank you.

[The joint prepared statement of the panel follows:]

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

THE PRESIDENT'S STRATEGY FOR IMPROVING MATHEMATICS AND SCIENCE EDUCATION

TESTIMONY OF

THE HONORABLE D. ALLAN BROMLEY, DIRECTOR
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

THE HONORABLE LAMAR ALEXANDER, SECRETARY
DEPARTMENT OF EDUCATION

THE HONORABLE WALTER MASSEY, DIRECTOR
NATIONAL SCIENCE FOUNDATION

THE HONORABLE RICHARD TRULY, ADMINISTRATOR
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BEFORE THE

COMMITTEE ON EDUCATION AND LABOR

AND THE

COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

UNITED STATES HOUSE OF REPRESENTATIVES

FEBRUARY 27, 1992

INTRODUCTION

Chairman Ford, Chairman Brown, members of the Committee on Education and Labor, and members of the Committee on Science, Space, and Technology, it is a pleasure to appear before you today to present the President's strategy for strengthening mathematics and science education in America.

One month ago, President Bush reiterated in his State of the Union address his commitment to making the United States the world leader in education:

> (C)hanges are here, and more are coming. The workplace of the future will demand more highly skilled workers than ever, more people who are computer literate and highly educated. We must be the world's leader in education. We must revolutionize America's schools.

The President recognizes, as all of us here recognize, that jobs, education, and science and technology are now inextricably intertwined. Science and technology are among the primary catalysts for the dramatic changes now sweeping our businesses, homes, schools, and other sectors of our society. To respond positively to these changes and to reap fully the benefits they offer, our Nation's citizenry must understand and utilize science and technology rationally, responsibly, and productively. Simply put, education, training, and literacy in science and technology will mean more and better jobs, a more competitive economy, and a higher standard of living.

We face significant challenges, however, in raising our educational achievement to satisfy our national needs. No single program, agency, or level of government can respond totally to the necessary but extraordinary tasks of bringing student achievement, teacher preparation, and adult training up to the competitive standards our Nation requires. Instead, what is needed is a comprehensive, integrated national strategy to strengthen mathematics and science education at all levels and for all participants, a strategy that draws upon the resources, expertise, and commitment of the private and public sectors, including the federal, state, and local governments.

The President and the Nation's governors have embarked on a decade-long campaign to improve educational performance, focused on attainment of six specific National Education Goals. Three of these Goals speak directly to the importance of increasing science and mathematics achievement and literacy among our students and citizenry.

Based upon these goals, the President has constructed two complementary initiatives to improve mathematics and science education. The first is the President's unified interagency initiative in mathematics and science education, described in the FY 1992 and FY 1993 reports, "By the Year 2000: First in the World." The second is AMERICA 2000, a broader educational initiative designed to attain all six National Education Goals. These two initiatives, including their goals, will be described below.

As part of these initiatives, the President will launch several new efforts to increase the utilization and effectiveness of federal resources for mathematics and science education. These efforts include special programs to enhance the skills of mathematics and science teachers; new emphases on educational technologies; and a new effort directing federal laboratories to undertake projects to improve mathematics and science education and make surplus computers and scientific equipment available to local schools.

Federal agencies are also strengthening their own educational programs and activities. These efforts increasingly involve collaboration with other federal agencies, state and local governments, and the private sector. The sum total of these activities is a renewed commitment and specific plan of action for making America the world leader in mathematics and science education.

Chairmen and members of your two committees, the witnesses before you today represeat four key players in the President's strategy for improving mathematics and science education. The Department of Education, the National Science Foundation, and the National Aeronautics and Space Administration, working closely with the White House Office of Science and Technology Policy and other federal agencies and departments, have developed an integrated, coordinated approach for making the United States first in mathematics and science education. We look forward to discussing with you the challenges we face, the goals that our Nation has set for itself, and our common course of action to prepare our students and citizens for the twenty-first century.

OUR NATION'S EDUCATIONAL CHALLENGE

Our Nation, like the world around it, is experiencing dramatic changes, resulting in large measure from advances in science and technology. With these changes come growing demands to revolutionize our schools and to invest in our future through education and training. Now more than ever we must take action to provide for a more highly skilled work force and more highly educated and more technically literate society. Education, literacy, and science and technology are the ingredients for producing more and better jobs, a more competitive economy, and a higher standard of living.

Our Nation's educational achievements, however, have not kept pace with our needs. The state of America's educational system has been documented over the past decade by a number of studies and assessments, which indicate the following:

- Based on the latest international assessments, American elementary, middle, and high school students continue to score below their international peers in mathematics and science achievement. America's children also watch more television and do less homework than do their peers in most countries surveyed.

- Elementary school mathematics and science teachers are frequently under prepared to teach in their fields, and are often further handicapped by outdated and inadequate textbooks and equipment.

- Nearly 30 percent of U.S. high schools offer no courses in physics; 17 percent offer no courses in chemistry; and 70 percent offer no courses in earth or space science.

- The average amount of instruction time devoted to science in grades 4-6 is only one half-hour per day, while in grade 3, seven out of ten teachers spend less than two hours per week on science instruction.

- Women, minorities, and persons with disabilities will make up 65 percent of net new entrants into the U.S. work force between now and the year 2000, yet few obtain science or mathematics degrees, and fewer still pursue scientific or technical careers.

- Large sectors of the American public are characterized by low levels of science and mathematics literacy.

The problems of student achievement, teacher competency, and adult performance are substantial, complex, and interrelated. Meeting these challenges exceeds the resources and capabilities of any single program, agency, or government. Instead, our Nation needs a comprehensive, integrated national strategy to strengthen mathematics and science education at all levels and for all participants.

Recognizing the need for a national strategy, the President and the Nation's governors convened in September 1989 the Nation's first Education Summit and initiated a decade-long campaign to increase educational performance at all levels. At the center of this campaign are six National Education Goals, which are intended to capture America's attention and to energize America's resolve to restructure its schools and to raise its expectations for student, teacher, and adult performance. Three of the six goals -- Goals #3, 4, and 5 -- are directly relevant to mathematics and science education:

Goal #3. By the year 2000, American students will leave grades 4, 8, and 12 having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so that they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy.

Goal #4. By the year 2000, U.S. students will be first in the world in science and mathematics achievement.

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Goal #5. By the year 2000, every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship.

To accomplish these ambitious but vital goals, the federal government must play a leadership role in education reform. Although the federal government provides only six percent of the Nation's total support for elementary and secondary education, the federal government is the user and patron of a large segment of the Nation's scientific and technical work force, and is critically dependent upon the achievements of this work force. Furthermore, the federal government is the primary source of student support at the graduate level, and, in some graduate fields, the only source of support. To spur improvements in mathematics and science education, the federal government can draw upon its great and unique resources to mobilize national support, develop comprehensive strategies, and support programs and activities nationwide.

As previously noted, President Bush has exerted such leadership by constructing two complementary initiatives to improve mathematics and science education. The first is the President's unified interagency initiative in mathematics and science education, described in the FY 1992 and FY 1993 reports, "By the Year 2000: First in the World." The President's mathematics and science education initiative is fully integrated with and supportive of the President's second educational initiative, AMERICA 2000. AMERICA 2000 is a national effort designed to mobilize state, local, and private resources to improve education school by school, community by community. AMERICA 2000 is designed to achieve all six National Education Goals, including those most relevant to mathematics and science education. These two initiatives are described below.

BY THE YEAR 2000

Background on CEHR. The reports "By the Year 2000: First in the World" describe the President's interagency initiative in mathematics and science education. This Presidential initiative represents the collaborative efforts of sixteen federal departments and agencies, working through the Committee on Education and Human Resources (CEHR) of the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET). The CEHR is an interagency committee consisting of senior officials from the participating departments and agencies, who meet on a regular basis to develop recommendations and analyses relevant to mathematics and science education.

The CEHR, like other FCCSET committees, is an important forum for coordinating federal activities in science and technology. In particular, CEHR is charged with identifying and reviewing federal programs supporting science, mathematics, and engineering education; improving interagency planning, coordination, and communication; recommending appropriate priorities and strategic objectives; developing and updating long-range plans; and supporting the efforts of the National Education Goals Panel and other organizations to reform math and science education.

Interagency coordination through the CEHR offers a number of distinct benefits to the public and private sectors. Working through the CEHR, federal agencies are able to assemble and assess information on the entire federal effort in mathematics and science education, and thereby establish clear and consistent priorities; maximize the effectiveness of scarce resources; target high-priority areas for support; avoid unnecessary duplication of effort; and generally improve communication and collaboration among federal agencies. Successful programs can be more easily replicated, and their results more readily assessed and disseminated, thus raising the overall quality of the federal effort in education. Furthermore, the CEHR has established a network of mathematics and science education professionals across all federal agencies, who can serve as valuable sources of information, expertise, and coordination. Together, these activities facilitate interagency collaboration, joint funding of projects, and reliable evaluations of the total federal effort.

State and local governments and the private sector also benefit from CEHR activities. The government-wide inventory of mathematics and science education programs published by the CEHR has been an invaluable resource for teachers, administrators, and other people needing access to federal educational programs, laboratories, resources, and expertise. The net result of CEHR activities will be better education for students, a stronger teaching force, improved collaboration between the public and private sectors, greater public support for mathematics and science education, and higher scientific literacy among the Nation's citizenry.

Toward these ends, the CEHR has developed a comprehensive framework to set the strategic objectives and priorities for the federal effort in mathematics and science education. The CEHR has identified four key objectives for the federal education initiative: (1) improving science and mathematics performance; (2) strengthening the elementary and secondary teacher work force; (3) ensuring an adequate supply of new entrants into the science and technology work force, including women, minorities, and persons with disabilities; and (4) improving the science literacy of the American public.

To accomplish these objectives, the CEHR framework establishes implementation priorities within and among four educational levels -- elementary and secondary education, undergraduate education, graduate education, and general public science literacy. Among these four levels, the CEHR considers elementary and secondary education to be the highest priority. Within elementary and secondary education, the priorities established by the CEHR are, in order, teacher preparation and enhancement; curriculum reform; organizational and systemic reform; and student support, incentives, and opportunities. The priorities for each of the four educational levels, which appear in Figure 1 at the end of this testimony, are consistent with the National Education Goals adopted by the President and the governors.

The FY 1993 mathematics and science education initiative. The President's FY 1993 budget request represents the second year that mathematics and science education has appeared as a Presidential initiative, and the third year that President Bush has proposed significant increases for federal programs in mathematics, science, engineering, and technology education.

For FY 1993, the President is requesting a total of $2.1 billion for improving mathematics and science education across all educational levels. This total represents an increase of $138 million or 7 percent over the FY 1992 enacted levels for these programs, and a $626 million or 43 percent increase over their FY 1990 enacted levels.

The most notable increase in federal support for mathematics and science education has been in the area of elementary and secondary education, which has grown by 123 percent between FY 1990 and the FY 1993 request. The President is requesting $768 million for elementary and secondary education in FY 1993 (37 percent of the total federal request for mathematics and science education), an increase of $117 million or 18 percent from FY 1992. The President is also requesting $481 million for undergraduate education (23 percent of the total); $750 million for graduate education (36 percent of the total); and $93 million for science literacy (4 percent of the total). These allocations -- particularly the emphasis on elementary and secondary education -- are consistent with the National Education Goals, AMERICA 2000, and the CEHR priorities framework. Additional information on individual program elements included in the FY 1993 budget request is provided in Figure 2 at the end of this testimony.

Of the sixteen agencies participating in the Committee on Education and Human Resources, eleven provide direct support for mathematics and science education. The other five agencies provide facilities, expertise, or other important contributions. The FY 1993 request for each of the eleven funding agencies is provided in Figure 3 at the end of this testimony. Key features of the agency budget requests include the following:

- Five agencies will support approximately 90 percent of the total federal effort in mathematics and science education in FY 1993. They are, in order of support, the National Science Foundation ($537 million in FY 1993); the Department of Defense ($416 million); the Department of Health and Human Services ($416 million); the Department of Education ($393 million); and the Department of Energy ($113 million). The six other participating agencies -- the Department of the Interior, NASA, the Department of Agriculture, the Smithsonian Institution, the Environmental Protection Agency, and the Department of Commerce -- will collectively contribute $217 million in FY 1993 for mathematics and science education.

- The percentage increases in support for mathematics and science education in FY 1993 are highest for the Department of Education (34 percent); the Environmental Protection Agency (18 percent); and the Department of

Agriculture (11 percent). In dollar terms, the largest increases are requested by the Department of Education ($98 million) and the National Science Foundation ($15 million).

- At the elementary and secondary level, the Department of Education ($371 million) and the National Science Foundation ($286 million) collectively will fund 86 percent of the total federal effort in FY 1993.

- At the undergraduate level, the Department of Defense ($176 million) and the National Science Foundation ($146 million) collectively will fund 67 percent of the total federal effort in FY 1993.

- At the graduate level, the Department of Health and Human Services ($364 million) and the Department of Defense ($235 million) collectively will provide 80 percent of the total federal effort in FY 1993.

- In the area of science literacy, the Department of the Interior ($43 million) and the National Science Foundation ($31 million) collectively will fund 80 percent of the total federal effort in FY 1993.

AMERICA 2000 AND MATHEMATICS AND SCIENCE EDUCATION

AMERICA 2000 is a long-term national strategy to attain the six National Education Goals. The federal effort under AMERICA 2000 will be limited but vigorous. Spearheaded by the Department of Education, the federal government will support education reform by setting standards; highlighting successful activities and examples; contributing funds when appropriate; providing flexibility in exchange for accountability; and pushing for change.

AMERICA 2000 has four interdependent parts:

Track 1. For today's students, we must radically improve our Nation's schools, all 110,000 of them, to make them better and more accountable for results.

Track 2. For tomorrow's students, we must invent a New Generation of American Schools to meet the demands of a new century.

Track 3. For those of us already out of school and in the work force, we must keep learning if we are to live and work successfully in today's world. A "Nation at Risk" must become a "Nation of Students."

Track 4. For schools to succeed, we must look beyond the classrooms to our communities and our families. Schools will never be much better than the

commitment of our communities. Each of our communities must become a place where learning can happen.

AMERICA 2000 and the President's initiative in mathematics and science education are complementary. All four tracks in AMERICA 2000 support the three National Education Goals most directly relevant to mathematics and science education, in addition to the other three national goals.

AMERICA 2000 calls for the development of world class standards to define what American students should know and be able to do in specific subject areas, including mathematics and science. The need for these standards is illustrated by the recent results of the International Assessment of Educational Progress, which indicate that those countries with the highest student achievement also had the highest expectations of performance for their youth. The congressionally-created National Council on Education Standards and Testing recently released its report endorsing the development of voluntary standards for both mathematics and science, as well as for other subjects.

A consensus on world-class standards in mathematics and science is beginning to develop. The National Council of Teachers of Mathematics has published its Curriculum and Evaluation Standards for School Mathematics and Professional Standards for Teaching Mathematics. World-class standards for the study and teaching of science are under development by the National Academy of Sciences, the National Science Teachers Association, and other organizations. The National Science Foundation and the Department of Education are actively engaged in supporting standards development. Both agencies are providing support to the Mathematical Sciences Education Board of the National Academy of Sciences, as well as to the newly established Coordinating Council on Education, which will develop science standards. NSF is also currently supporting projects implementing the mathematics standards developed by the National Council of Teachers of Mathematics. When completed, these standards, together with assessments to measure progress toward these standards, will guide both the content and methods of teaching, as well as define the expected performance of our students.

Implementation of these standards is the next major step. A number of states have already begun to develop mathematics and science curriculum frameworks based upon these voluntary standards. States will then use these curriculum frameworks to provide guidance on content, instruction, and assessment to their schools. The Department of Education will support the development and implementation of such state curriculum frameworks in mathematics and science. Furthermore, the Department has begun to establish a National Clearinghouse for Science and Mathematics Materials, as well as regional consortia that will collect and disseminate information on exemplary programs and materials in mathematics and science.

Accompanying the emergence of world-class standards are new methods of assessing student knowledge. The National Goals Panel and the National Council on Education Standards and Testing have each called for new forms of testing and accountability. Secretary Alexander chaired the Mathematical Sciences Education Board's committee on assessment, which led to the report For Good Measure: Principles and Goals for Mathematics Assessment. The National Assessment of Educational Progress tests have begun to include new forms of assessment. Their 1990 mathematics tests contained some performance-based items to assess student achievement. The Department of Education supports a major research center on student testing, as well as a number of other centers that also conduct related work. The Department also will support pilot studies to explore performance assessment. At the National Science Foundation, seven major awards have been made in the area of assessment. These activities can strengthen and broaden the ability of teachers to diagnose instructional needs. The development of more authentic assessment procedures will permit better diagnosis of the strengths and weaknesses of students, thereby leading to development of more effective instructional materials.

Just as AMERICA 2000 supports the objectives of the initiative coordinated through the CEHR, CEHR activities likewise support implementation of AMERICA 2000. In its construction of the FY 1993 mathematics and science education strategy, the CEHR was guided by both the National Education Goals and AMERICA 2000. The CEHR strategy is designed primarily to promote achievement of Goals #3, 4, and 5, and to complement and enhance the AMERICA 2000 strategy. For example, the emphasis placed on elementary and secondary education by the CEHR strategy is consistent with Tracks One and Two of AMERICA 2000, which call for improving today's and tomorrow's schools, respectively. Similarly, Tracks Three and Four of AMERICA 2000, which deal with lifelong learning and community support for education, are relevant to the CEHR's new focus on general public science literacy. This is the first year in which science literacy has been identified separately within the CEHR budget, as well as the first year in which a strategy for increasing public awareness about science has been articulated.

NEW EFFORTS IN FY 1993

As part of the CEHR and AMERICA 2000 initiatives, the President is proposing three major new efforts in FY 1993 to improve mathematics and science education: (1) enhancement of teaching skills of mathematics and science teachers; (2) a new program authorizing federal laboratories to play a direct role in strengthening mathematics and science education and to provide schools with surplus computers and scientific equipment; and (3) new efforts in educational technologies, including the use of computers, computer networks, and other advanced technologies in the classroom.

Enhancement of mathematics and science teachers. The most important near-term action to improve mathematics and science education is to enhance the content knowledge and pedagogy of the Nation's current teaching force. If the U.S. is to become

first in the world in mathematics and science achievement, then our teachers must be able to deliver a world-class education to their students.

For these reasons, and consistent with the AMERICA 2000 emphasis on teacher training, the President's FY 1993 budget proposes an improved program for training the Nation's current mathematics and science teachers, with the objective of preparing these teachers to provide curricula that are tied to world-class standards. As an initial step, the FY 1993 budget proposes to double (to 45,000) the number of teachers receiving federal assistance for intensive training. Such training generally lasts a minimum of 20 days and includes a follow-up period, during which assistance is provided to teachers to adapt new disciplinary knowledge and pedagogical techniques to classroom settings. When combined with the short-term training opportunities provided to 725,000 teachers under existing programs, federal efforts in teacher training will reach almost half of the Nation's elementary and secondary mathematics and science teachers. Over time, the teacher enhancement initiative will provide in-depth, up-to-date training for all of America's elementary and secondary mathematics and science teachers.

The teacher enhancement initiative will involve the complementary efforts of the National Science Foundation, the Department of Education, and the Department of Energy and other mission agencies with federal laboratory facilities. In particular, the National Science Foundation will provide intensive training and follow-up opportunities to nearly 25,000 teachers, through its merit-based teacher enhancement program. To broaden and strengthen the impact of this program, NSF will increasingly emphasize and encourage: (1) development of "leadership teams" of educators and administrators, who can return to their school systems and provide quality training to their colleagues; and (2) development of school system-wide and district-wide projects. NSF is also encouraging awardees in its other programs, such as the Statewide Systemic Initiative, to stress activities that increase the competencies of science and mathematics teachers.

The Department of Education, through the Eisenhower National Program, will support in-service professional development projects for elementary and middle-school mathematics and science teachers, to improve teachers' subject matter knowledge, and to improve the teaching of mathematics and science, particularly in grades K-8. Grants will go to the local school districts to ensure that the core subjects of mathematics and science are taught in a well-articulated and non-repetitive manner throughout the K-12 years. To attain this end, the projects are to be designed and carried out by experienced master teachers of mathematics and science at the high school level, working directly with elementary and junior high teachers in their own districts. Close collaboration with university scholars and educators who are knowledgeable about world-class standards in mathematics and science will be required, but local schools and school districts will remain the focus of these efforts. The Department of Education will also require that funding in the higher education portion of the Eisenhower State Grants program be used only for teacher training experiences of at least 20 days duration.

Federal laboratory assistance -- training and equipment. The Department of Energy has initiated an active program at five national laboratories to utilize existing facilities to train students and teachers in science and mathematics. Based on this experience, the Department will lead an interagency effort to establish at federal laboratories programs to provide training and research experience for elementary and secondary teachers of mathematics and science, and, when possible, for students, their parents, and the public as well. These programs would involve partnerships with universities, state and local school authorities, and training programs administered by the National Science Foundation and the Department of Education.

The laboratories can also contribute to the availability of equipment for classroom laboratories, an essential ingredient for world-class education. Studies have shown that student performance and interest in mathematics and science can be enhanced significantly by access to and experience with computers and other scientific equipment. Yet, in times of tight budgets, schools and school districts often defer investment in such equipment. In 1990, for example, 80 percent of the Nation's eighth graders did not have access to computers in their mathematics classrooms. In the mid-1980s, two-thirds of all classrooms in grades 4-6 had no scientific equipment at all. To address this situation, the CEHR is examining mechanisms to make available to local school systems excess federal personal computers and scientific equipment. The amount of excess federal personal computers and related equipment is expected to rise in coming years, due to the turnover of federal equipment currently in use.

Educational technologies. A major objective of the AMERICA 2000 strategy is to establish national electronic networks that will link American schools and other sites where learning occurs. The teaching of mathematics and science is ideally suited for the use of electronic dissemination technologies. In an era when scientific discoveries are made daily and recently published textbooks quickly become obsolete, electronic networks allow students, educators, and researchers to receive and share up-to-date information on science and technology, thus providing an invaluable supplement to standard curricula.

The Administration proposes to focus attention on accelerating the availability of educational technology in the classroom. Federal agencies are presently engaged in two major activities in this area. First, the National Science Foundation, the Department of Agriculture, and the Department of Education, through its Star Schools program, support distance learning programs, which include improving access by rural school systems and smaller colleges to educational resources. Second, the Departments of Energy and Defense, the National Science Foundation, and NASA presently use telecommunications technologies to disseminate scientific and technical information in support of agency programs and missions and to provide technical training to federal employees. These technologies include satellite broadcasting, fiber optics, and computer networks. For example, NASA's telecommunications system Spacelink and education videoconferences provide educators with instructional information on aerospace research

and the aerospace program, current NASA news, classroom materials, and other information targeted specifically to teachers and students. In addition, the National Science Foundation is capitalizing on rapid advances in telecommunications and networking by proceeding with the development of the National Research and Education Network (NREN), as proposed in the President's High Performance Computing and Communications (HPCC) Initiative. Under the HPCC initiative, the National Science Foundation will develop sophisticated educational databases, as well as requisite network facilities, standards, and user-friendly software that will meet the varied needs of students, educators, and research scientists.

The CEHR agencies plan to hold a major conference to identify the users and providers of existing and proposed educational technologies, and later review the merits of those technologies. Educational technologies that demonstrate the most promise for revolutionizing classroom instruction may be selected for support under special fast-track demonstration programs. This conference will also be of importance to the High Performance Computing and Communications Initiative, mentioned above.

AGENCY-TO-AGENCY COLLABORATION

The CEHR provides one mechanism for interagency coordination; agency-to-agency collaboration is yet another. Several agencies have recently negotiated Memoranda of Understanding and other agreements to facilitate cooperation, and thus further maximize the effectiveness and availability of scarce federal resources.

In February 1992, the National Science Foundation and the Department of Education signed a Memorandum of Understanding (MOU) to institute a formal mechanism for interaction between the two agencies. The NSF-ED MOU focuses primarily on elementary and secondary education, where the responsibilities of the two agencies most coincide and for which combined agency resources comprise nearly 85 percent of the total federal effort. The MOU will lead to more effective planning, information exchange, and collaboration between the two agencies in science, mathematics, engineering, and technology education. More effective planning and collaboration, in turn, will lead to more effective resource utilization; promote achievement of the National Education Goals; and generally strengthen the programs of both agencies.

Under the MOU, the Department of Education and the National Science Foundation will develop a joint five-year plan and common priorities; identify complementary strategies and agency roles; and review new and existing programs. Milestones will be established, and progress toward their achievement monitored. To accomplish these tasks, the two agencies have appointed a working group of nine senior-level officials, who will meet regularly to set an agenda and to identify program areas that will benefit most from collaboration. The working group will make extensive use of program experts within both agencies to work on issues involving program design, management, and implementation. The program areas proposed for consideration under this MOU

include teacher enhancement and preparation, telecommunications and networking, dissemination strategies, and program evaluation.

Other agencies have negotiated similar agreements. NASA is broadening its interagency collaboration to increase and leverage its education outreach programs at the elementary, secondary, and higher education levels. One such example at the precollege level is the Tri-State Education Initiative, involving 28 school systems in the adjoining states of Mississippi, Alabama, and Tennessee. NASA, the Department of Education, the Tennessee Valley Authority, and the private sector are working closely with the newly formed consortium to develop a quality education system to permit the citizens to obtain the necessary skills for gainful employment in America's high-technology economy. NASA is also supporting several of the Department of Education's AMERICA 2000 efforts, which can serve as innovative models that could be adopted for educational systemic change elsewhere in the country.

At the higher education level, the Department of Energy, NASA, and seven other agencies have established a joint effort to centralize agency information for university users about student educational opportunities, fellowships, and research opportunities. This program, known as the Federal Information Exchange (FEDIX) is designed to help improve communication between the academic community and the federal government.

NASA and the National Science Foundation are also collaborating to strengthen the ability of certain academic institutions to compete for academic research funding. NASA's Space Grant College and Fellowship Program includes a component that is modeled after NSF's Experimental Program to Stimulate Competitive Research (EPSCoR), which is designed to assist institutions in those states that historically have been less successful in competing for federal research funds. NASA's programs include an explicit component to establish a communications and interaction framework involving NASA, NSF, and the academic community. The Department of Defense, the Department of Energy, and the Environmental Protection Agency have also initiated EPSCoR-inspired programs, while a similar program is currently under design by the National Institutes of Health.

EXPEDITING THE TASK AHEAD

Over the past two years, President Bush has acted aggressively to put in place the organizations, plans, and programs needed to improve mathematics and science education in America. The Education Summit, the National Education Goals, and the two complementary strategies that quickly followed are only the first steps. The CEHR agencies will augment ongoing educational programs with new initiatives, which will reflect the goals and priorities developed to date. The CEHR will undertake a number of organizational and programmatic activities to coordinate these efforts:

- Strategic Planning Working Group. The CEHR is establishing a Strategic Planning Working Group to ensure that the CEHR initiative is fully integrated with AMERICA 2000. The Working Group will lay out a multiyear strategic plan for CEHR to address each educational level.

- Working Group on Technology Education. National Education Goal #5 and AMERICA 2000's Track 3 both refer to the need for students and adults to be prepared for productive employment and to possess the knowledge and skills needed to compete in a global economy. The CEHR will expand its program inventory to include technical education. To do so, the CEHR must determine relevant fields and occupations that qualify as technical training; decide on minimal skill levels and activities appropriate for consideration; identify program activities that depict federal involvement in this area; and develop a baseline.

- Working Group on Federal Schools. The Department of the Interior will lead the CEHR agencies in an examination of how the federal government teaches mathematics and science in the federal school systems, including the Bureau of Indian Affairs school system and the Department of Defense Dependent Schools system. The Working Group will identify ways to ensure that educational expertise and resources found elsewhere in the federal government is utilized most effectively in these schools. Federal schools should be models of effective science and mathematics education for the country.

- New Statewide Directory of Federal Education and Human Resource Programs. During 1992, the CEHR will develop a state-by-state directory of all federal programs in mathematics, science, and technology education. This directory will provide parents, teachers, and school administrators with current and complete information on federal programs available at the local and national levels.

In addition to activities developed and coordinated through the CEHR, the agencies are pursuing a variety of unilateral means to strengthen their mathematics and science education programs to maximize their effectiveness. For example, agencies are seeking to improve evaluations of the federal educational effort and the dissemination of successful results and, through research, better understand the processes of teaching and learning.

Evaluation and dissemination of the total effort. Evaluation and dissemination represent special opportunities for the CEHR agencies. CEHR priorities and initiatives require careful review to sharpen their direction and determine their impact. Likewise, materials about effective practices identified through CEHR initiatives need to be publicized, supported, and disseminated to maximize the effectiveness of the federal investment.

Evaluation and dissemination most often focus on individual programs within agencies, where the bulk of the CEHR member activities occur. The CEHR enables agencies to share information on effective evaluation and dissemination techniques. For example, certain agencies, such as NSF and DOE, emphasize primarily the development of exemplary materials, while other agencies, such as the Department of Education with its National Diffusion Network, support the infrastructure to disseminate such materials. The CEHR can be the mechanism for bringing together complementary parts into an integrated federal effort.

Research on Teaching and Learning. In order to reach world-class levels of achievement in mathematics and science by the year 2000, it is essential that we better understand and appropriately reform both teaching and learning techniques. Research efforts are underway to determine the means by which such a dynamic transformation may occur.

The Department of Education supports research on teaching and learning of mathematics and the sciences primarily through two national centers -- the National Center for Research in Mathematical Sciences Education (NCRMSE), and the National Center for Science Teaching and Learning (NCSTL). The NCRMSE conducts research in cognition and understanding of mathematics in key curricular areas and provides needed assessments. In particular, the Center is identifying a variety of assessment practices that are aligned with emerging world-class standards in mathematics. The Center is also looking at the kinds of intuitive mathematical knowledge that children from differing cultural and socioeconomic levels bring to their school settings. Classroom implementation of the Center's research on children's cognition of addition and subtraction (a project that also receives funds from NSF) is now in place.

The National Center for Science Teaching and Learning is identifying and studying the external factors that influence science teaching and learning. These factors include social and cultural factors, public expectations and societal initiatives, school organizations, new technologies, economic and political forces, and integration of science across content areas. Knowledge gained from this Center will be crucial to the successful implementation of systemic change.

The National Science Foundation has a full program of basic and applied research on effective teaching and learning of science and mathematics at all educational levels. For example, "Project IMPACT" has designed, implemented, and is evaluating models to enhance student understanding and support teacher improvements in predominantly minority public schools. NSF's "Teaching for Conceptual Understanding and Self-Regulation through Collaborative Problem Solving in Science" is examining learning and problem-solving by middle schools students and developing appropriate instructional strategies and materials. "Problem Solving in Quantitative Science: Practical Instruction and Cognitive Models" will translate past laboratory studies into interactive instructional methods to teach general problem-solving strategy, general material, and decision and checking processes. Finally, NSF's "Teachers' Learning from Reform: The

Case of Mathematics Instruction in California" will study the influence of texts, tests, teacher enhancement and policy makers on the implementation of the California Mathematics Framework by elementary school teachers.

WORKING TOGETHER FOR EDUCATIONAL EXCELLENCE

The task of reforming America's educational system requires a coordinated, cooperative effort among many players. The Administration neither can nor should attempt to tackle this job by itself. Just as the Administration has designed its strategies to include cooperation and coordination among federal, state, and local governments and the private sector, so too is the Administration looking to establish a cooperative working relationship with Congress to turn these integrated strategies into reality. Our appearance before you today is a testament to our collective need to establish new ways to work together.

We feel it is particularly important that the unified, coherent nature of the federal initiatives in mathematics and science education should not become lost among disparate committee jurisdictions. Rather, we should look for ways to work with Congress to preserve and promote the integrated interagency framework developed by the CEHR as it is considered by the various responsible congressional committees. Similarly, we need to promote the priorities and relative strengths put forward by the CEHR agencies in their FY 1993 budget requests. And we need to promote the comprehensive nature of AMERICA 2000, without which we cannot hope to attain the six National Education Goals by the year 2000.

Your two committees -- the Committee on Education and Labor and the Committee on Science, Space, and Technology -- have jurisdiction over the principal agencies supporting mathematics and science education. These agencies include the Department of Education, the National Science Foundation, the National Aeronautics and Space Administration, the Department of Labor, the non-defense programs of the Department of Energy, and the technology programs at the Department of Commerce. When considering future authorizations and legislation for these agencies, we hope that the Committees will support the unified framework developed by the CEHR agencies, a framework that builds upon the strengths of each agency; promotes synergism and effective use of resources; and avoids unnecessary duplication and overlap.

We also seek Congress' support for the four components of AMERICA 2000. The four tracks of AMERICA 2000 are themselves interrelated and interdependent -- the loss or weakening of any one track will have detrimental impacts upon the other three, and thus upon the Nation's ability to spur comprehensive educational reform. To this end, we urge Congress to pass the "AMERICA 2000 Excellence in Education Act."

Chairman Ford, Chairman Brown, members of your two committees, that concludes our testimony. Thank you again for this historic opportunity to appear before both of your committees to present the President's strategy for improving mathematics and science education. We would be pleased to respond to any questions you may have.

Appendix: FY 1993 Mathematics and Science Education Budget Highlights by Agency

National Science Foundation. In FY 1993, the National Science Foundation (NSF) will aggressively pursue its strategy to spur systemic reform of state school systems. Through the alliances and partnerships among all major players in the educational system forged under NSF's state systemic reform initiative, NSF will support exemplary projects for reform of state elementary and secondary educational delivery systems; school system-wide or district-wide teacher enhancement activities; and teacher preparation programs that link schools of education with disciplinary departments within universities. In addition, NSF will intensify efforts to make fundamental changes in the science, mathematics, and engineering education of underrepresented minority students. Systemic programs, which cover the elementary and secondary and undergraduate continuum, will raise the quality of education received by such students and increase the number choosing to participate in these fields.

To satisfy its rapidly expanding responsibilities and ensure its leadership role in science, mathematics, engineering, and technology education, the Foundation is designing a new organizational structure for its educational programs. This organizational reform will improve the formulation of NSF programs and advance the Foundation's reform agenda. Furthermore, NSF will be strengthening its monitoring and evaluation activities; expanding its dissemination mechanisms; and providing better technical assistance to potential bidders and awardees of NSF grants.

The Foundation's FY 1993 budget request for mathematics and science education totals $537.2 million, an increase of $15.4 million or 2.95 percent from FY 1992. NSF's budget request includes the following:

- $286.2 million for elementary and secondary education;
- $146.3 million for undergraduate education;
- $73.9 million for graduate education; and
- $30.8 million for public science literacy.

Department of Health and Human Services. In FY 1993, the Department of Health and Human Services (HHS), particularly the National Institutes of Health, will extend its efforts to improve public understanding of the life sciences by expanding its speakers bureau, developing exhibits, and supporting national media programs on a variety of biomedical research issues. HHS will continue to encourage and support direct involvement of its scientists in elementary and secondary classrooms and with elementary and secondary teachers in a variety of settings. For 1993, as part of its new Science Teaching Enhancement Award Program, HHS will implement a Pre-Service Teacher Training Program targeted at future K-12 teachers.

The Department of Health and Human Services' FY 1993 budget request for math and science education totals $416.5 million, an increase of $4.5 million or 1.1 percent from FY 1992. HHS's budget request includes the following:

- $21.8 million for elementary and secondary education;
- $25.0 million for undergraduate education;
- $364 million for graduate education; and
- $5.6 million for public science literacy.

Department of Defense. The Department of Defense's efforts to ensure that the Nation has an adequate supply of future scientists and engineers are supported through the Department's graduate and post-doctoral grant programs. Undergraduate programs are also available to improve educational performance and teaching methods for skill training programs for DOD personnel.

The Department of Defense's FY 1993 budget request for math and science education totals $416.0 million, which is equal to the FY 1992 appropriation. DOD's budget request includes the following:

- $4.97 million for elementary and secondary education;
- $176.2 million for undergraduate education; and
- $234.8 million for graduate education.

Department of Education. For FY 1993, the Department of Education (ED) will continue to support the development of world class national standards for student achievement in science and the development of state K-12 curriculum frameworks in math and science, and plans for teacher education certification, inservice staff development, and recertification appropriate to the standards. The Department is also seeking $36 million for a new teacher enhancement program, to be tied to the standards and curricular framework. Under this program, expert math and science teachers from secondary schools will provide intensive inservice training to all elementary and middle school teachers in selected schools districts. The Department has also proposed that 25 percent ($62 million) of the funds for the Eisenhower Mathematics and Science State Grant Program be used by institutions of higher education in each state only for teacher training efforts of at least twenty days duration.

Finally, the Department is proposing two new competitive grant programs for bilingual education, which are designed to: (1) provide bilingual instructional programs focusing on mathematics and science to students with limited English proficiency; and (2)

provide bilingual education teacher training, with a particular emphasis on mathematics and science.

The Department of Education's FY 1993 budget request for math and science education totals $392.5 million, an increase of $98.7 million or 33.6 percent from FY 1992. The Department's budget request includes the following:

- $371.2 million for elementary and secondary education;
- $21.0 million for undergraduate education;
- $0.33 million for public science literacy.

Department of Energy. In FY 1993, the Department of Energy (DOE) will sponsor the Second Annual National Science Bowl for high school students. The Bowl will involve 32 teams selected from regional competitions among approximately 12,000 students. Other DOE activities will include expanded support for rural-urban partnerships with DOE laboratories, and expanded alliances between DOE laboratories and facilities with minority colleges and universities. These alliances are intended to encourage students to pursue careers in environmental sciences and waste management. DOE will also lead a new interagency teacher enhancement initiative that will utilize the federal laboratories.

The Department of Energy's FY 1993 budget request for math and science education totals $113.2 million, an increase of $4.65 million or 4.3 percent from FY 1992. DOE's budget request includes the following:

- $32.4 million for elementary and secondary education;
- $56.9 million for undergraduate education;
- $19.6 million for graduate education; and
- $4.3 million for public science literacy.

Department of the Interior. In FY 1993, over 3 million teachers and students will be reached through the National Park Service's "Parks as Classrooms" program, which builds science activities around park resources. At the same time, 2,000 teachers will participate in the U.S. Geological Survey (USGS) Joint Education Initiative (JeDI) workshops. These workshops will teach them how to use CD-ROM technology to improve their high school science classes. In addition, 100 college professors will improve their teaching skills during short-term USGS faculty preparation programs. Over 500 students will work as summer interns for the U.S. Fish and Wildlife Service during FY 1993, thus improving their science skills and becoming exposed to science and its principles through fish and wildlife issues.

The Department of the Interior's FY 1993 budget request for math and science education totals $88.4 million, an increase of $5.7 million or 6.9 percent from FY 1992. The Department's budget request includes the following:

- $25.3 million for elementary and secondary education;
- $8.7 million for undergraduate education;
- $11.1 million for graduate education; and
- $43.3 million for public science literacy.

National Aeronautics and Space Administration. In FY 1993, NASA will begin to implement its ten-year Education Strategic Plan, developed in concert with the National Education Goals and the President's CEHR initiative. This strategic plan will guide the agency's efforts in both precollege and higher education, with significant emphasis to be placed on underrepresented groups, educational technology, evaluation, dissemination, and leveraging activities. NASA will complete in FY 1993 the congressionally directed feasibility and implementation study regarding the proposed National Scholars Program, designed to increase substantially the number of underrepresented groups at the PhD level in science and engineering over a ten-year period. The agency also will significantly expand its teacher enhancement programs.

Finally, NASA will complete in FY 1993 the implementation of the National Space Grant College and Fellowship Program. The Program encompasses 50 state consortia of colleges, universities, nonprofit organizations, industry, and state and local governments, a total of approximately 350 institutions. A significant component of this Program is educational outreach at the elementary and secondary level, emphasizing the CEHR priorities.

NASA's FY 1993 budget request for math and science education totals $82.2 million, an increase of $4.5 million or 5.8 percent from FY 1992. NASA's budget request includes the following:

- $16.7 million for elementary and secondary education;
- $32.4 million for undergraduate education; and
- $33.2 million for graduate education.

Department of Agriculture. With its commitment to advance minority participation in mathematics and science, the Department of Agriculture (USDA) has more than doubled the funding for the 1890 Institution Teaching and Research Capacity Building Grants Program since the program was launched in FY 1990. USDA has also expanded its Graduate Fellowship Grants Program to reduce shortages of scientific expertise and is stimulating curricula revitalization and faculty development through its Higher Education Challenge Grants Program.

The Department of Agriculture's FY 1993 budget request for math and science education totals $22.65 million, an increase of $2.3 million or 11.3 percent from FY 1992. USDA's budget request includes the following:

- $0.72 million for elementary and secondary education;
- $13.5 million for undergraduate education; and
- $8.43 million for graduate education.

Smithsonian Institution. The Smithsonian Institution intends in FY 1993 to strengthen and expand its programs in education, especially at the elementary and secondary level. Major efforts include: (1) Leadership Institutes (located at the National Science Research Center), which prepare educators from across the country to spearhead efforts to improve elementary science education in their districts; (2) Project Star (Smithsonian Astrophysical Observatory), which develops innovative high school teaching materials in astronomy and trains master teachers to implement courses based on the materials; and (3) Education Outreach (National Air and Space Museum), which develops and disseminates materials to assist teachers, especially in fostering school children's interest in science.

The Smithsonian Institution's FY 1993 budget request for math and science education totals $10.0 million, an increase of $80,000 or 0.84 percent from FY 1992. The Smithsonian's budget request includes the following:

- $0.63 million for elementary and secondary education;
- $0.50 million for graduate education; and
- $8.9 million for public science literacy.

Environmental Protection Agency. In FY 1993, the Environmental Protection Agency (EPA) will provide $3 million in grants to consortia of post-secondary institutions to operate an environmental training and education program, and more than $2 million to provide grants to support local, state, and non-profit environmental education. The EPA Office of Environmental Education (OEE) is developing a clearinghouse of

information on environmental education materials, which will eventually include information from all federal agencies. An internship program for college students and fellowship program for in-service teachers to improve training of environmental professionals will also be established.

The Environmental Protection Agency's FY 1993 budget request for math and science education totals $9.8 million, an increase of $1.5 million or 18.1 percent from FY 1992. EPA's budget request includes the following:

- $8.0 million for elementary and secondary education;
- $0.8 million for undergraduate education; and
- $1.0 million for graduate education.

Department of Commerce. In FY 1993, the Department of Commerce (DOC) will expand from 25 to 30 the number of fellows participating in its National Institute of Standards and Technology/National Research Council Postdoctoral Research Associateships Program.

The Department of Commerce's FY 1993 budget request for math and science education totals $3.9 million, and increase of $180,000 or 5 percent over FY 1992. The Department's educational programs are focused on the graduate level.

Figure 1: FY 1993 Federal Math/Science Education Priority Framework

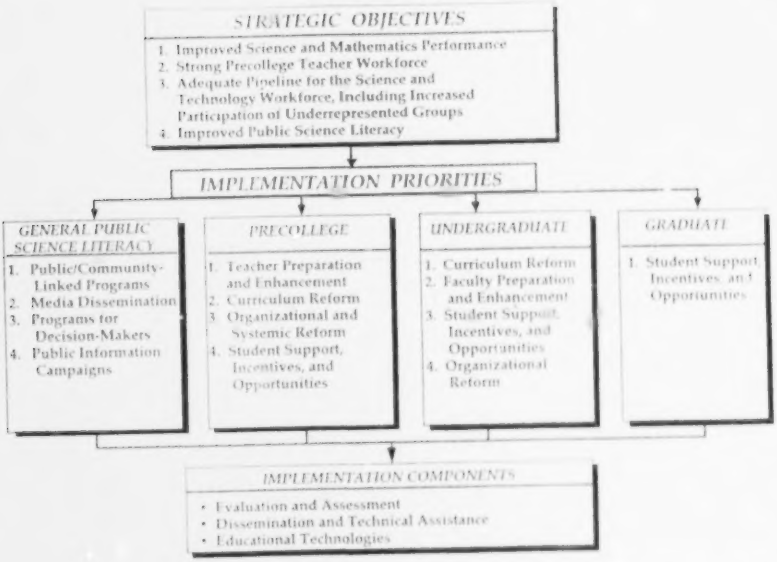
STRATEGIC OBJECTIVES
1. Improved Science and Mathematics Performance
2. Strong Precollege Teacher Workforce
3. Adequate Pipeline for the Science and Technology Workforce, Including Increased Participation of Underrepresented Groups
4. Improved Public Science Literacy
IMPLEMENTATION PRIORITIES
GENERAL PUBLIC SCIENCE LITERACY
1. Public/Community-Linked Programs
2. Media Dissemination
3. Programs for Decision-Makers
4. Public Information Campaigns
PRECOLLEGE
1. Teacher Preparation and Enhancement
2. Curriculum Reform
3. Organizational and Systemic Reform
4. Student Support, Incentives, and Opportunities
UNDERGRADUATE
1. Curriculum Reform
2. Faculty Preparation and Enhancement
3. Student Support, Incentives, and Opportunities
4. Organizational Reform
GRADUATE
1. Student Support Incentives and Opportunities
IMPLEMENTATION COMPONENTS
• Evaluation and Assessment
• Dissemination and Technical Assistance
• Educational Technologies

Figure 2: FY 1992-1993 Growth by Program Element (dollars in millions)

Major Categories/Elements	FY 1992 Baseline	FY 1993 Total Request	Change	Percent Change
Grand Total	$ 1,954.74	$ 2,092.23	$ 137.49	7%
Precollege	$ 650.71	$ 767.95	$ 117.24	18%
Precollege Teacher Preparation and Enhancement	382.56	436.51	53.95	14%
Precollege Curriculum and Materials Development	83.35	91.58	8.23	10%
A. Precollege Instructional Materials Development	61.65	65.87	4.22	7%
B. Precollege Educational Technologies	21.71	25.71	4.00	18%
Precollege Student Incentives and Opportunities	46.48	68.08	21.60	46%
A. Precollege Direct Student Support	27.80	63.46	35.66	128%
B. Bridging to Postsecondary	18.68	4.62	-14.06	-75%
Precollege Organizational Reform	60.34	72.65	12.31	20%
Precollege Comprehensive or Multifaceted Programs	27.35	31.40	4.05	15%
Precollege Dissemination and Technical Assistance	17.63	17.84	0.21	1%
Precollege Program Evaluation and Studies	24.10	40.90	16.80	70%
A. Precollege Evaluation and Assessment	11.10	10.90	-0.20	-2%
B. Precollege Data Collection and Studies				
C. Precollege National Standards and Testing	13.00	30.00	17.00	131%
Precollege Other Total	8.89	8.99	0.10	1%
Undergraduate	$ 444.25	$ 480.77	$ 36.52	8%
Undergraduate Program Evaluation and Studies	3.60	3.90	0.30	8%
A. Undergraduate Evaluation and Assessment	3.60	3.90	0.30	8%
B. Undergraduate Data Collection and Studies				
Undergraduate Educational Technology	31.00	31.00	0.00	0%
Undergraduate Dissemination and Technical Assistance	36.66	49.22	12.56	34%
Faculty Preparation and Enhancement	103.45	97.71	-5.74	-6%
Undergraduate Curriculum and Materials Enhancement	80.28	74.59	-5.69	-7%
A. Undergraduate Course and Curriculum	23.17	23.12	-0.05	0%
B. Undergraduate Laboratory Equipment	168.55	190.05	21.50	13%
Undergraduate Student Incentives and Opportunities	131.63	134.65	3.02	2%
A. Undergraduate Financial Assistance	36.67	50.05	13.38	36%
B. Undergraduate Research Experiences and Coops	0.25	5.35	5.10	2040%
C. Bridging to Four Year or Graduate School	25.90	32.40	6.50	25%
Undergraduate Organizational and Operational Reform	56.30	58.04	1.74	3%
Undergraduate Comprehensive or Multifaceted Programs	18.80	18.46	-0.34	-2%
Undergraduate Other Total				
Graduate	$ 768.88	$ 750.20	$ -18.68	-2%
Predoctoral Fellowships	99.77	99.54	-0.23	0%
Predoctoral Traineeships	180.28	160.81	-19.47	-11%
Postdoctoral Fellowships	98.79	98.70	-0.09	0%
Postdoctoral Traineeships	154.79	155.62	0.83	1%
Graduate Program Evaluation and Studies	0.10	0.10	0.00	0%
A. Graduate Evaluation and Assessment	0.10	0.10	0.00	0%
B. Graduate Data Collection and Studies				
Graduate Other Total	235.16	235.43	0.27	0%
Public Science Literacy	$ 90.89	$ 93.32	$ 2.43	3%
Education Programs for Decision Makers	1.74	5.10	3.36	193%
Media Dissemination	21.73	22.09	0.36	2%
Public or Community Linked Dissemination	56.90	59.50	2.60	5%
Public Information Campaigns	6.95	6.33	-0.62	-9%
Public Science Literacy Program Evaluation and Studies	3.57	0.30	-3.27	-92%
A. Public Science Literacy Evaluation and Assessment	3.57	0.30	-3.27	-92%
B. Public Science Literacy Data Collection and Studies				
Public Science Literacy Other Total				

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Figure 3: FY 1993 Budget Request by Agency and Major Program Area
(dollars in millions)

MAJOR CATEGORIES	Total Request	USDA	DOC	DOD	ED	DOE	HHS	DOI	SI	NSF	NASA	EPA
GRAND TOTAL	2092.23	22.65	3.68	415.97	382.53	113.21	416.45	88.43	10.04	537.20	82.27	9.80
Precollege Total	767.85	0.72		4.97	371.20	32.39	21.84	25.50	0.63	286.20	16.70	8.00
Teacher Preparation/Enhancement	436.51			0.63	286.50	16.84	5.19	2.00	0.33	114.80	7.92	2.30
Curriculum Development	91.56				2.70	4.51	2.56	6.90	0.22	67.70	5.00	2.01
Comprehensive/Organizational Reform	104.05				20.00	3.58	4.14			74.00	0.29	2.04
Student Incentives	68.08	0.72		4.34	20.00	6.55	9.97	14.71		11.00	0.48	0.21
Program Evaluation and Student and Dissemination	58.74				42.00	0.57		0.15	0.08	13.80	0.10	1.44
Other	8.99					0.34		1.54		4.90	2.22	
Undergraduate Total	180.77	13.50						4.72		146.50	12.38	0.80
Faculty Preparation/Enhancement	49.22					11.52	0.08	1.82		30.80	5.00	
Curriculum Development	97.71			38.90		3.22	0.10	1.03		52.90	1.56	
Comprehensive/Organizational Reform	90.64	13.50		6.80	6.00		22.52	0.43		28.80	12.19	
Student Incentives	190.05			100.50	15.00	25.05	2.24	5.33		28.80	12.33	0.80
Other, includes education technologies, program evaluation and dissemination	53.35			30.00		17.08		0.11		5.00	1.10	
Graduate Total	1,000	0.43	0.3	411.0		0.00	0.00	0.00	0.00	52.00	13.19	0.00
Predoctoral Fellowships	99.54		0.30	16.70		8.21	5.64	0.10	0.09	52.40	15.30	0.80
Predoctoral Traineeships	160.81	4.00		3.90		0.55	128.99	10.42		8.40	4.35	0.20
Postdoctoral Fellowships	98.70		3.38	10.50		6.43	51.23	0.55	0.41	13.10	13.10	
Postdoctoral Traineeships	155.62	4.45				0.50	150.69					
Other	235.53			203.70		3.93	27.46				0.44	
Agency Administration/Other	93.33	0.05	0.01	0.01	0.00	0.00	0.00	0.04	8.91	30.80	0.00	0.00
Education Programs for Decision Makers	5.10					0.35		3.35		1.40		
Media Dissemination	22.09					1.13	1.21	3.25		16.50		
Public/Community Liaison/Dissemination	59.50					1.34	3.23	33.12	8.91	12.90		
Public Information Campaigns	6.33				0.33	1.42	0.96	3.62				
Public Science Literacy Evaluation	0.30					0.10	0.20					

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Chairman FORD. Thank you very much.

Mr. Kildee has to represent us in the budget process, so I will call on him first.

Mr. KILDEE. I'm not going to ask any questions, but I want to thank the witnesses for appearing before this joint committee. I think it's a very, very important hearing, and I think your testimony will be very helpful as we really try to assist you and assist the schools of this country to arrive at the goals that we are setting for them.

The only reason I'm speaking right now is I have to be at the Budget Committee at 11:00 o'clock. I'll tell you why. I stepped out for about 40 seconds yesterday and almost lost $235 million for education. So you have to be there all the time. So I'm going over there now and make sure we get the proper budget figures at least for education.

We have discussed the Eisenhower Act in that Budget Committee. There is enthusiasm for the Eisenhower Math-Science Act, and we want to make sure we get proper funding for it. So I just want to thank all of you.

Mr. Secretary, I again appreciate the visit you made to Flint, MI. It was great. They're still talking about it. I know it's been very, very helpful. I have some news clippings for Mr. Okun.

Thank you very much. I have to dash now before they steal some more money over there. Thank you very much.

Mr. ALEXANDER. Thank you, Mr. Kildee.

We still have a follow-up to do on that visit, on the interagency work——

Mr. KILDEE. That's right.

Mr. ALEXANDER [continuing]. With the preschool children.

Mr. KILDEE. Mr. Okun has talked to me about that. We appreciate that. Thank you.

Chairman FORD. Mr. Secretary, I can assure you that Mr. Kildee is doing the Lord's work over there. We're several billion dollars in your pocket above where we started a few days ago on the budget process.

Mr. ALEXANDER. Good for you.

Chairman FORD. Every day that he goes over there, he rings the cash register in your shop. So strength to your arm, Dale.

Mr. Secretary, first clear one thing, because there are a lot of observers to this procedure. You mentioned that Congress had enacted a law providing for a national test. I quickly consulted with the staff and then Mr. Goodling and I remembered it.

We have a colleague over on the other side who has been talking about testing to find out who really turns out the most excellent students. Some of us think that the motivation for that is kind of an elitist motivation, that you identify the elitist populations or schools by finding the outstanding performers. That is not what you're talking about with testing in order to find out where we have to do a better job to bring the mass of the population up.

I can reassure you that the Appropriations committees have not appropriated one dollar for that purpose, so if somebody in your shop gets an inspiration to go out and do it, they had better check how they're going to pay for it. Because we thought it was better to quit arguing about it and just let it go, and then starve it to death.

That's what we've been doing since 1988, when that unfortunate language found its way into an authorizing bill. That's not the cleanest way to do it, and it's not the way they teach it in school, but it frequently happens around this place.

I would like to ask the panel to consider with me a minute what we go through if this process—and this is not new to this committee, and I'm sure not to the Science and Technology Committee. We've had "Chicken Littles" telling us the sky is failing, we don't know enough about science and math when we get through with our school system in this country, ever since I was in school. I know that we are capable in this country, when the American people see a payoff for learning about science and math, of teaching large numbers of people science and math, very quickly and very effectively.

I left high school at the age of 17, after my junior year, to enter the United States Navy in World War II. I became an aviation ordnance man and along the way I was being taught science and math and didn't know it, but never had any question that I wanted to learn it because I knew what the payoff was; what that was going to open for me as an advancement and the ability to save my life and somebody else's. I was young enough to even want to have the ability to take somebody else's life. I don't know if I could get that steamed up any more.

I was with people like me, who hadn't finished high school; who the United States Navy was capable of training to an extremely fine line of competence, because there was a specific training level that was required to do the missions that were there, far less sophisticated than those jobs require today. So maybe it's no longer possible to achieve what the Navy achieved then.

As a result of that experience, however, I took something called the Fleet Examinations. When the smoke cleared away and the rest of my operational squadron was sent out to play with the Japanese in the Pacific, I was sent to college in Nebraska to become an officer. I had been raised in an environment with absolutely no expectation that I would ever see the inside of a college.

Now, fortunately for me, or unfortunately for the country, whichever way you look at it, I forgot all that math and science as quick as I could after I got through the officer training program and went back to college at the end of the war because I had now decided that math and science didn't have an objective that was very good. What the hell are you going to do, become a school teacher? School teachers were then, as they are now, amongst our lowest paid professionals. I got diverted and went to law school. That's been happening ever since.

I've been watching this phenomena all of my adult life; the fact that math and science is not presented to our young people in their life as something that's essential to their safety or happiness in the future.

Now, I have read several books over the years about math anxiety amongst women, and early in my evolution to the point I've reached now, I'm excepting the fact that women have brains, too. My generation had to work their way through that pretty carefully. I was interested in this phenomena of math anxiety. What we had was a societal attitude, that it was rather unfeminine for a

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young woman to go off to the college or university and say that she was going to study math or science. It was also totally impractical because nobody was going to hire a woman to work for General Electric or anybody else developing products as a scientist who was a female. So there was no payoff out there for women.

So laying aside the blame that we put for years—we've blamed the fact that women were not high achievers in math on the fact that they were women—we overlooked the fact that, because they were women, they did not have an opportunity ahead of them to use math and science the way men could use math and science for a good future.

Now, Mr. Massey, I have also worked my whole 28 years on this Committee, and before that, in education, going all the way back to the Fifties, representing school boards, with the interesting phenomena of how we get more minorities in the classroom. I can tell you that we don't have one more male teaching math in cities like Detroit or Chicago or New York today than we had when I came on this Committee 28 years ago. Because if we find a member of the minority population and get them interested in math and science, the last thing he's gong to do is cash it in by being a classroom teacher and passing it on to somebody else. There are some exceptions, but they're extremely rare. Just count the number of black males in classrooms teaching math and science in this country, and compare that to the relatively small number of black males who succeed in a math and science educational program.

What I guess I'm trying to get at is I finally have almost concluded that the traditionalists in the liberal arts colleges are not going to turn young Americans on to the idea that math and science are important. General Motors, General Electric, you name it, can turn it on. The Secretary just mentioned what he and I talked about the other day. I have 24 plants in my district belonging to the Big 3 making automobiles, even today. In my generation, you just had to be warm and eager and you got hired. In a few years you're making good pay and you can get married, buy a house. Today you have to take a written test in math, science, and reading comprehension to become an assembler, the lowest job in an automobile assembly plant. So there is no open entry level for a literate or functional illiterate in the auto industry any more. That's a change that's taken place in my life, and it's very dramatic.

As a consequence, the schools in my district, who are in that milieu of a rapidly changing industrial base, are able to point to the way you get in the front door for a job and say look, you've got to have a better preparation in math and science than your dad had or you're not going to get a steelworkers job, or you're not going to get a job in the automobile industry. But you go a hundred miles from Detroit and they can't do that because they're not in that environment where kids grow up with an ambition to get one of those high-paying industrial jobs.

Finally, a study came to my attention just a week or so ago that, in looking around the country to see where, in fact, kids are doing better than the average as they finish high school in math and science. They bore out the wisdom of something this Committee did a few years ago during the Reagan administration. We started funding something that people had been doing in some parts of the

country called "two plus two" education, tying two years of vocational education at the high school level to two years of college, so that it was a continual, single program designed for a student that started in their junior year in high school, not college-bound, but vocationally inclined. The purpose is to give them a vocational skill by the time they finish high school, and extra math, extra science, so that they could go on in college and become a trainable person capable of growing with technology in the future.

Lo and behold, the study shows that in North Carolina, in the Richmond County schools, the kids who were in vocational training in the two-plus-two program were scoring as well as all of the kids who were headed for college in math and science when they came out of school. The entire group as a whole increased its algebra scores. Now, I submit that to you as evidence of the fact that, unless we can use the wisdom that your departments have and the people you have, and ours as well, to find a way to connect the value of learning math and science with the future of young people in America, they're not going to be interested in math and science.

Now, we tried another shortcut a couple of years ago—five years ago, as a matter of fact. Mr. Chandler of the State of Washington pointed out to us that there were on the west coast, engineers and other people who were absolute whizzes in math and science; particularly, a lot of retired military, and that with a very short training program, you could turn them into teachers. So we put a program on the books and, unfortunately, it's not being well taken care of. It's called the Mid-Careers Training Program, to take somebody who is already a "cracker jack" mathematician or scientist and turn them into a teacher and get them into a high school classroom.

Now, we've got all these people coming out of the military; we've got people being churned all the time through the contractors that do business with your operation, Mr. Truly; and everybody is running around here wondering what we should do with all that brain power. It seems to me it's out there and we ought to be getting our heads together to figure out how we can do it.

Mr. Alexander, I've got a scheme floating around back here, to get the walls down so we can get our hands on some of that fat pot of gold that goes to defense. What we've got to do is find a way to spend their dollars for our objectives. This Committee has got all kinds of transition bills before it that are concerned with the welfare of people who are losing their military and civilian employment careers in the Defense Department—base closings, all right? Why don't we spend some of the Defense Department's money to do something for those people and at the same time capture the resources that are represented by these already highly skilled people that no longer is apparently needed by the Defense Department to continue the missions that they had in the past. There are a lot of things that we can do together, aside from simply sitting down and saying we're going to provide some more money to teach math and science.

If we put a billion dollars out there on the table and said to the American schools, "Take this money and teach math and science", it isn't going to change one young person's motivation to really work at learning math and science. We have to do that. Wars do it

for us. We have to talk and repeat what the Secretary said about Desert Storm.

I often repeat, Mr. Secretary, it's probably the first time we ever went to war in this country with virtually everybody that we sent into combat being a high school graduate. When I went to the service in World War II, between 20 and 25 percent of the 18 year olds that went into the service were high school graduates. We've come up three-fold since then. But yet we're still in trouble.

The fact of the matter is that this society, more and more, is prepared to consign people to the ash heap if they follow what we tell them is adequate for education. The President and the Secretary have goals. We're all for the goals. But we can sit here and talk about being number one in the year 2000 until we turn blue; if we don't find a different way to do things, we're going to be where we are now eight years from now. It may or may not be a lot more money; it may be just a different approach to things than we've been doing so far.

So I would welcome anything that you gentlemen might suggest here or hereafter, as something that the Congress ought to pursue to enable you to help this country capture the resources that come under your control.

Does anybody want to comment now?

Dr. BROMLEY. Mr. Chairman, I think one of the very important points you've made is that, unless we can motivate youngsters, we're not going to get anywhere. It is unhappily the fact that a very large number of our children in urban centers, for example, will never get exposed to anything involving mathematics or science in the real world.

So one of the major programs that we have underway, just getting underway, is to use the more than 700 national labs that we have in this country, not to teach teachers how to teach—because people in the labs don't know necessarily how to teach—but they can provide access to youngsters so that the kids can get a feeling of "you know, if I stick with this, I could do this some day in the future." That motivation is all important, and it is working and working astonishingly well in laboratory after laboratory, just a few weekends of working with an active engineer, scientist, mathematician, to let the youngsters see what career opportunities are really out there. It's the sort of experience you related in your Navy days, and I think we can build on that, and we have to build on that.

Because in science, mathematics and engineering, as distinct from most other professions, the career decisions are made before the junior year in high school. If we've lost them at that point; we've lost them permanently. And you're absolutely right, that the kids have to see what's in this for them. Why should they work harder than they would otherwise be expected to do.

So I think we're on the track, and we clearly need your help in making it possible for us to expand this kind of program nationwide.

Chairman FORD. Well, I can tell you that this committee will entertain, with a warm and generous heart, any concept that spends your money instead of Mr. Alexander's money, because his is get-

ting scarcer and scarcer, with more and more pressure on him all the time.

I would like to observe that Mr. Massey and Mr. Truly both said that you suspected that a sixth grade science class in Mississippi was no more technologically modern today than it was when you went to school in Mississippi. That's really kind of sad when you realize that while people are talking about how much time our kids spend in front of television sets, as a parent and a grandparent, I have often asked "What difference does it make?" One of the differences it makes is that the stuff they see in a classroom sometimes looks awful bland compared to a half-hour program by a "Mr. Fixit" on television, who does scientific experiments right in front of their eyes, with fancy equipment, and wow, even the ads that General Electric runs are exciting.

Now, what do they see in school that tells them they aren't going to have a part in causing something to zoom off into space the way it does in a General Electric ad? We don't sort of connect those things very well for the kids. If school people in your State or any other State are still trying to put the same thing out, with a bland textbook like they stuck in front of me—and Michigan wasn't any better, and probably isn't in most parts of my State. But the fact is that we have to do things differently.

The Secretary is being called a revolutionary, and having a lot of trouble with me, by the way, along the way, arguing for how much he wants to do differently. But I'm willing to concede that we aren't going to be able to run the operation that any one of your people here are responsible for by the year 2000 if we don't find a new form of energy for this wagon.

Mr. Brown.

Chairman BROWN. Thank you very much, Mr. Chairman.

This discussion about the importance of motivation, of course, strikes a note in all of us. We know that motivation is key. It takes me back to the conference that Admiral Watkins had in Berkeley, along with Dr. Seaborg, about three years ago, in which one of the most fascinating programs—it revolved around this question of motivation, how do you get young minorities into science and math attracts. We had a speaker from one of the universities in Florida who spoke to how they were doing it successfully, how they motivated the young people into these kinds of careers. It was a comprehensive, sensible program. You identified the capable, motivated ones, you give them a supporting network, you give them exposure to the engineering laboratories during summer vacation, you give them assurances of a job after they graduate. All of these things you put together and you get a steady stream of black people moving into this area.

Now, I'm sure that that's not an original idea. If it's been used in Florida, it must have been used in other places. But we don't seem to have that ability to make a commitment that goes outside the classroom, to involve private industry, to involve other things of that sort.

Now, can we work that into a plan in some fashion? Could we do that? Could we build a program to do that? Could we fund efforts to do that in some of the institutions around the country?

Dr. BROMLEY. Mr. Chairman, we're at least making, I think, a reasonable start, because as part of the program that Secretary Watkins' committee has put together, and certainly fostered by his own special interest within his own Department of Energy, there is a major program going on now utilizing these national labs across the country to do just what you've discussed. That is working, and it's working remarkably well.

One of the best examples I know is the one at Newport News, where the CEBAF facility has undertaken to bring in minority youngsters, to give them a mentor who stays with them throughout their entire high school career, right through until they get into college. An enormous fraction are now going forward and making it through to college. This is working.

All we have to do really is expand this, not only to the Federal laboratories, but, as you suggest, to get industrial organizations involved in educating the young people that they themselves will need in the future. There is real interest in doing it, and we can help, I think, in working with you, working with the industrial sector, just to make all of this come together in a coherent way.

Chairman BROWN (presiding). Thank you.

I'm not going to belabor this point. I want to recognize some of the other members here because we've been gifted with an exceptionally large turnout of members. You encourage that by recognizing them once in a while.

Would you like to start out on this side?

Mr. GOODLING. Thank you, Mr. Chairman. Just one very quick—some have been waiting a long time, so just one very quick question.

I notice in CEHR's report they concluded that Federal support for formal and informal programs at the community college level needed to be strengthened because of the critical role such institutions play in preparing the work force in the near future. And then they go on in their 1993 report to suggest that little progress has been made in this area. I wondered whether any of you wanted to comment on that, either the value of what they said or the statement that very little is happening.

Dr. MASSEY. I think it's a very important segment of the institutional structure that's going to be so important in addressing these issues of getting more youngsters into science and technology and utilizing those skills in the work force. Clearly the community college is key in that.

As you note, the report pointed out an area that has been somewhat neglected compared to others. In this 1993 budget, you will see that, in fact, the FCCSET Committee, as well as the individual agencies, particularly at the National Science Foundation, we will put renewed emphasis on addressing that sector, the community college, but not in isolation. In some of the things that Mr. Ford pointed out, trying to see how the community college can play a key role in being a bridge between the schools, the high schools and colleges.

I was just in Texas last month and they, for example, started a very effective program throughout the Texas A&M system, linking that with community colleges, in which they will reach hundreds of thousands of students, many of them minority students, in a

comprehensive program using those community colleges. So it's going to be an ever more important segment of the strategy.

Chairman BROWN. Thank you, Mr. Goodling.

I have a list of members on the Democratic side, I think in the order in which they appeared, and I would like to recognize them in that order. Mr. Roemer of Indiana.

Mr. ROEMER. Thank you, Mr. Chairman. I would ask unanimous consent to submit a statement for the record.

Chairman BROWN. Without objection, so ordered.

[The prepared opening statement of Mr. Roemer follows:]

Opening Statement for Rep. Tim Roemer, Joint Hearing of the Committee on Science, Space and Technology and the Committee on Education: Science Education, Thursday, February 27, 1992

I want to thank both Chairman Brown and Chairman Ford for having the foresight and leadership to conduct this joint hearing today. I am one of the five members who has the distinct privilege of serving on both these Committees, and the work we are doing on each is critical to America today.

Today's hearing focuses our attention on Science Education, an issue that is important to a dual agenda of my own: America's children and our nation's ability to compete.

This country's young people and their future have been on the back burner for far too long. We have an obligation to examine our education priorities, and rebuild every single school district in the nation so that learning and opportunity are once again the hallmark of the American educational system.

This obligation extends to the future of our country itself. If we do not rebuild our schools and create a future for our children,

how will they in turn run this nation and pursue our economic and global interests? How will our children compete with the children of Europe or the Pacific Rim? How will they maintain the America that our parents worked so hard to build?

The United States has been a great nation almost since the day it began, and our heritage is to remain a great nation, perhaps forever. But greatness imparts upon us a great responsibility, one that we have neglected for too long.

It is time for us to recognize the importance of giving our children, today, the advantages that our world competitors have been giving their children for years, while we have been ignorant of our own future's needs.

Our economy, our entire country's future, can be compared to one of our children. The country's future, like that child's future, must be nurtured and cared for, with all the investments in our power, if it is to grow, prosper, thrive, and lead.

The choice is before us, continued greatness, or mere survival. The former is our heritage, the latter is a disgrace to the great and wonderful inheritance our American forebears have left us.

Mr. ROEMER. Thank you.

Mr. Chairman, it is a pleasure for me, being on the Education and Labor Committee and on the Science, Space, and Technology Committee, to have such a distinguished panel of witnesses here today and to share in some of the debate that we face as members of both those committees and some of the tough choices that we have to make when we vote for different programs in Congress.

We hear the debate about the budget deficit, about the importance for spending money on education, for emerging new technology, our manufacturing base that is eroding, a recent article in the day-before-yesterday's New York Times talking about the United States now falling behind the Japanese in spending on research and our industry. We're trying to make some tough choices around here. We need to be tougher about it. We need to exercise more discipline.

My question is—and maybe I could ask Mr. Truly and Secretary Alexander to respond. I think we've got to make these choices on programs. And with all due respect to the Chairman of Science, Space, and Technology, this is something we disagreed on last year, was the space station. We're going to spend an 11 percent increase on the space station, over $2 billion——

Chairman BROWN. I'm sorry I recognized you now. [Laughter.]

Mr. ROEMER. Thank you, Mr. Chairman.

Chairman BROWN. Go ahead.

Mr. ROEMER. He is gracious. When I argued against the space station, was the only member of the full Committee to vote against it last year, he always treated me with the utmost of respect and grace. I don't know how long he'll continue that, but I sure respect my chairman.

Anyway, I voted against that. We have a huge budget deficit. We're looking at $400 billion now. I think this money would be better spent both on some educational and manufacturing initiatives, to rebuild this country, to make some tough decisions on the real decisions, not a tax package that I'll vote against later today that doesn't do some good things for the long term of this country.

But what are we going to do for the long term? I think it's education and manufacturing and technology. Middle class jobs.

My question for Mr. Truly and Secretary Alexander is, how do you justify a $2.5 billion space station, an 11 percent increase in space, when we're not taking care of the problems here on Earth?

Admiral TRULY. Frankly, I think the space stations and programs are not really a direct——

Mr. ROEMER. I'm talking about the space station, not some of the other very good programs that are even being squeezed out by the space station.

Admiral TRULY [continuing]. Right. But the subject here is math and science education, and I think what you bring up is very, very relevant. Because space station is an example of an American leadership program that must be funded if we're going to continue American leadership in space, which we now thoroughly enjoy. It is exactly the kind of program that could take the anxiety in children about mathematics out, out of them, because children can be excited by the programs of astronauts, planets, space stations. So even though that is not the reason for the space station, there is a direct

connection between programs like that and the efforts and the funding that we have in math and science education to use that as a tool, if you will, as we get to young people in that portion of our math and science education which is to capture, at the youngest possible age, young people, and to drive the fear of mathematics and science out of them by seeing a relevance between things that they can study in school and dreams that they might have and see for the future of the Nation. So I——

Mr. ROEMER. That's a lot of money, Mr. Truly, for excitement. I would think that—Is it $30 billion or $40 billion now, and $100 billion to maintain it over the next 30 years? We're talking about $130 billion to excite our children?

Admiral TRULY. No, I didn't say that the purpose of space station was to excite our children. What I did say is that it is an example of the very types of programs that, in fact, do though.

To answer your question, the request for space station this year is a little over $2 billion, which is exactly at the level that the two appropriations committees voted and instructed us last year. We've taken $6 billion out of space station through the remainder of the decade, and I would be delighted if any of that money could find its way to math and science education. But I do not believe that money is the answer to this problem that's the subject of this hearing today.

Mr. ROEMER. You don't believe—Well, you see, I disagree. I think our taxpayers in this country want us making some tough decisions, and I would rather spend that money on software programs, such as Carmen San Diego, to get our kids interested in learning about history and geography and new technology in our schools, than saying, with a $40 billion space station, that's going to excite them.

Secretary Alexander, how would you respond to this debate?

Mr. ALEXANDER. Mr. Roemer, let me try to do it briefly. Number one, the only good news in the international assessment that came out a couple of weeks ago—comparing our students at age 9 and 13 in math and science with students from around the world—was for 9 year olds in science. We were third. And while it's difficult to be certain why, one reason appears to be that what our children learn outside of school while they're very young, and many people feel what they've learned on television about the space program especially, excites children, motivates their interest in science, which they keep at least through the second or third grade. That's a partial response.

The second is that money is important, and while the Federal budget has gone up 25 percent over the last four years, President Bush has recommended a 130 percent increase in Federal funding for math and science elementary and secondary programs. This FCCSET Committee has rounded up $2.1 billion of Federal spending on these programs, and we've asked you for some more money to help States with standards and curriculum and you can afford that. But in the end it's not pouring more money into the same system that will make us first in the world in math and science. I mean, the system has got to be turned upside down so that—and the President has recommended a whole series of things I won't go

into, but it includes this idea of starting from scratch, with break-the-mold new American schools.

There are 700 applications that have come into the private New American Schools Development Corporation. I am confident they'll be filled with technology that are not in southern Mississippi classrooms or in Tennessee or in South Bend classrooms. These will be exciting opportunities to excite children, motivate them to learn. That's one way to do it, the New American Schools, the higher standards, the national examination, the idea of giving middle and low income parents choices of schools so they can go to schools that do a better job in helping children learn math and science.

All of those efforts to radically change the American education system, much as Mr. Ford talked about, including introducing technology, that's what we must do. We've got to rethink education from top to bottom. So we're recommending more money, higher standards, world-class examinations, much more teacher retraining, in the same system. But more importantly, we're recommending turning the system upside down through the America 2000 strategy.

Mr. ROEMER. Well, I appreciate your answer. Mr. Secretary, I know from the quotes from you in this recent Newsweek article, too, where our kids, our 13 year olds tested behind 12 other countries, including Taiwan, Hungary, Switzerland, the Soviet Union, we had better turn things upside down and make some changes and put our priority on our children in this country. That comes down to spending the money that we get as a Congress better than we've been doing.

Mr. ALEXANDER. That's correct. Except for Switzerland, none of those countries spend more than we do per student on elementary and secondary education.

Mr. ROEMER. Well, I'm not saying—and I appreciate both chairmen's patience with me here. I'm not saying that money is the only answer. I am saying that we need to do more for our children, we need fundamental change in the education system, and we need, as a Congress, to be able to make some tough decisions around here and prioritize things.

Thank you.

Chairman BROWN. Thank you very much, Mr. Roemer. I think the questions you raise are increasingly going to be asked, about how we justify both the space station and education, are we getting results from it in one way or another, and we're going to have to verbalize those.

Chairman FORD (presiding). Mr. Gunderson.

Mr. GUNDERSON. Thank you very much, Mr. Chairman, and distinguished panelists. I appreciate you being here and being patient with us this morning.

I am struck as I listen to you, and I am struck as I look through the data, there is some indication that the Federal focus is on research, evaluation, and data collection. I don't see a lot of evidence that we're getting out into the field and really providing the money or the technical assistance to improve the quality of math and science teachers across this country.

Let me give you an example. First of all, I think we focus much too much on just inner city. I would guess we have an equal prob-

lem with elementary and secondary math and science education in rural areas. As I look at this report, I am struck by the fact that David Kearns was one of the vice-chairmen of this particular report, and I had Secretary Kearns in my district last fall, at which time he met with one of my schools of education. One of my local universities, motivated by America 2000, said they would like to set up a program where they can go out into the field and improve the quality of math and science education in our rural districts.

To his credit, Secretary Kearns came back to Washington and said he will see if he can't find someplace in the Federal Government where he can be of assistance in implementing this kind of a program. His research resulted in being as fruitless as my research has been. It produced evidence that there is simply no place in the Federal Government to provide assistance to a school of education at a university level, that has a desire to set up an outreach program to bring specifically targeted, rural elementary math and science teachers into that school and provide that assistance.

Now, I see some heads shaking, and frankly, I hope the heads shaking are right, because that's my question. Where, beyond the data collection and the evaluations and the research, do we have programs in the Federal Government that are going to go out and help these people in the actual preparation for teaching? Dr. Massey, you look like you've got an answer, and if you do, you're my friend forever.

Dr. MASSEY. I think the answer is that we've done a woefully inadequate job of educating Congress on what we do at the National Science Foundation. I mean, all of the emphasis in our programs are directed towards exactly what you're pointing out, that there needs to be. The highest priority in the FCCSET process is on teachers, teaching enhancement at the pre-college level. It received the highest increase this year, and it has the largest base.

The nature of the programs are exactly as you pointed out that are needed, connecting teachers with experts not only in universities but in the national laboratories and industry, helping them to work on problems to improve the quality of their teaching.

I don't know why we are not able to provide that information to your constituents, but I'm certain we probably have programs in your own State, if not in your district, that work with schools of education, science departments, and high schools, to train teachers in a hands-on way, to utilize new technology, to train students—I mean to use students in hands-on experiences in science classrooms.

Out of our budget at the Science Foundation of about a half-billion dollars in education, the majority of that is focused on programs of the type that you say are needed. So I would not want you to leave with the impression that the focus is on data collection, research and dissemination. It's exactly on the things that you say we should be doing.

Mr. GUNDERSON. Well, if it is, I'm going to ask any of you to direct your subordinates to bring the evidence to me. I'm not contesting what you're saying, but I will tell you that the Midwest Educational Research Laboratory is trying to figure out how we can find funding for this program and they haven't figured it out. So it isn't just a fault or breakdown of us at the local level not

being able to find this; it isn't a problem with the universities not being able to find this. The regional education laboratory hasn't been able to find any evidence of where they can get the kind of assistance and capital needed to make this happen. So I want you to know, if it does exist and it's not out there, it is real woefully inadequate in terms of making that knowledge available.

Dr. MASSEY. We'll be happy to work with you on getting that information out.

Mr. GUNDERSON. I appreciate that very, very much.

The second side of my question to you all is in the area of technical assistance through technology. The second desire that we face in rural America in terms of math and science education is how do we get the high technology necessary to bring the most current educational assistance, whether it be in telecommunications, uplinks and downlinks, et cetera. What are we providing in this whole comprehensive strategy that you all have developed in the area of high technology assistance to schools, or communities and schools, that otherwise would not have this access?

Dr. MASSEY. Another major emphasis of the EHR initiative, as well as another FCCSET initiative, called High Performance Computing and Communications, is just on this set of activities; that is, how do we use the high-speed networks that are being developed? Many of them were developed to connect researchers around the country. How do we now expand that network to the school level, to allow schools to share resources among themselves and also with the universities or other institutions that might have resources.

There are ongoing programs. One in Nebraska, as part of our Statewide Systemic Initiative, links schools throughout the State of Nebraska, a very sparsely populated State, in teaching mathematics. It brings together schools in Lincoln and Omaha that have resources to schools that are far spread around the State that have fewer resources. Another is in the State of Mississippi, where we are also using distance learning using the new high-speed networks. That's a very high priority in both initiatives. I think, as Secretary Alexander can say, their network connecting the schools that they use will now be connected with our new national research and educational network. The goal is to make every school in the Nation—give every school in the Nation access to this network.

Mr. GUNDERSON. I don't disagree with the goal. My question is, what is the strategy to implement that goal? Not every one of us has the Chairman of the Appropriations Committee from our State, so we're not all going to be as lucky as Mississippi in having a model project.

I don't see anywhere in this program a proposal that is perhaps going to work with the private sector in bringing that high technology equipment into every school in America.

I would suggest, to follow up the discussions of Mr. Roemer and, frankly, Chairman Ford, the only mechanism I am aware of to bring high technology equipment, such as computers, et cetera, into our schools today is the Chapter 2 block grant. If you will look at the history of the Chapter 2 block grant, we have not increased the funding for that program in at least the last five years, if probably not the last ten years. Unfortunately, there's no constituency

out there for Chapter 2 like there is for Chapter 1, et cetera. And yet that is the only tool that I know that my rural schools have used to bring high technology equipment into their school system.

What are the mechanisms by which we can assist these small, rural, undercapitalized schools in obtaining the modern high technology equipment they need for real science and math education?

Dr. BROMLEY. Mr. Gunderson, I can begin to address the question.

In a quite separate, one of the presidential initiatives in this year's budget, high performance computing and communication, as Dr. Massey has indicated, we have given it very high priority as an educational tool. The idea is—and we now have the technology; it's available—where a single fiber going into a classroom makes it possible for every child in that classroom to receive individualized, self-paced instruction, with repetition where it's required, psychic reward where it's appropriate.

The system now, as far as the technology is concerned, is available. What we have to do now is to develop the national network that will make that centralized capability available, as you say, to all the schools in the Nation.

Now, last year we requested a 27 percent increase in the funding for that program. It was apropriated by you gentleman and ladies in the Congress. This year we've requested an additional 23 percent. And our goal is to double funding for that kind of activity over the next three years.

I think that we have a program that is in place now that, before the end of this decade, will make it possible for at least a very large fraction of the schools in the Nation to be connected, so that they can have the benefit of the really superb teachers, wherever they may be, the very best in program and curriculum, and the expense to the individual school is not at all a large one. It's something that any normal school could fit within its budget, if the school board decides to give that priority.

The real gap is in getting the fiber optics to those schools. That is something that we are working on, working on very rapidly, with the private sector, to develop a truly national, broadband information highway.

Mr. GUNDERSON. It sounds encouraging. Can you provide me with further information on that——

Dr. BROMLEY. I shall be happy to.

Mr. GUNDERSON [continuing]. And how we might be helpful in working with you?

Dr. BROMLEY. I would be happy to.

Mr. GUNDERSON. Thank you, Mr. Chairman.

Chairman BROWN (presiding). Thank you, Mr. Gunderson.

The Chairman has asked me to recognize the distinguished Mr. Hayes from Illinois next, so Mr. Hayes, you're on. But before you begin, may I indicate that Secretary Alexander has to leave in just a short time. I would be glad to excuse him now, or if you want to direct a question to him, I would ask him to remain for that.

Mr. HAYES. Thank you very much, Mr. Chairman. I'll be very brief.

I have met the Secretary before. He's appeared before our Committee. There is one thing that still disturbs me that you might

want to address yourself to. We are still trying to achieve a level playing field when it comes to access to education, particularly in the areas which we're talking about here, science and math, space technology.

In Chicago, for example, which is where I hail from, 60 percent of the enrollment-plus in the public school system is minorities, mostly black. I think when you include the Hispanics as minorities, it gets up beyond 70 percent. I don't know how you can do it, but the system of determining the funds for a school district to supply the equipment for these kinds of subjects is determined by property valuation. And when you get to the poor neighborhoods where the poverty is prevelant, we find ourselves in a position where we spend, in the State of Illinois, which handles the distribution of Federal funds, through the Board of Education, is only about half as much. We spend about half as much on a kid that goes to school in the inner city as opposed to one who goes to school in the surrounding Chicago.

How can we change this? Certainly there is much talk that is geared more towards choice, parental choice, as to what school a kid should go to, and using the voucher system. This certainly is going to create a worse problem than we've got now if this comes into being.

My specific point is, what can we do on a Federal level to create a more level playing field when it comes to having access to the kind of programs we're talking about here now? I imagine—and I haven't checked it too clearly, closely—but I would venture to say that I can't figure one high school, public high school, in my district now, as configured before we redistricted it, that had computers. We just got computers in some of our schools, so we're trying to catch up in this respect. Has the Department of Education got a program that might really speed up the leveling off of the funds that might provide the things we want, to make these young kids—because we've got a real problem of a high ratio of dropouts, kids who enter as freshmen but don't stay long enough to get a diploma.

This is what I am really concerned about. What can we do, what can we do as an Executive branch, you as a Department, Secretary of Education, in conjunction with our congressional responsibility? We are forgetting about a good segment of our society when we approach this problem of education. Don't we think they can be scientists, too?

Mr. ALEXANDER. Mr. Hayes, thank you. The answer to your question is, of course, they can be scientists, too, and let me try to answer the question in two ways.

One of the two points I wanted to make today was that we believe all children can learn math and science, and that is why we think the first step is to set a high goal, then to support what the National Council of Teachers of Math has said are the new national math standards, and then to help Illinois to continue to change its curriculum framework, and then to focus this $2 billion of Federal money on retraining teachers so they can do a better job helping all students move ahead, and then to ask you to support increased funding to help the States do that.

We believe that that alone will make a big difference, because too often we say well, these kids can be scientists and, of course,

these kids can't. That's not true. We don't believe that. So that's a change in attitude that we've got to make as a country and that we've got to help families understand.

Now, the second thing I would like to say has to do with—after I would agree with you about that and the need for more money, which we've recommended, and someday I hope we'll agree on this—is that we would like to radically change the system. We would like, and the President has recommended, putting in the hands of every family in Chicago that makes less than $40,000 a year, a thousand dollar scholarship that they could spend at any school. So we would like first to say any child can be a scientist and here's a thousand dollars and you take that to the school that you think will help you do that.

Schools in Chicago spend more per student than they do in the town where I grew up. It's not just a matter of money. So we believe that that would help draw the middle and low income parents into schools that really meet their needs.[1] They believe their children can learn, and we genuinely believe that they will make a real difference.

We also believe in the idea of letting schools in Chicago start over with the money they've got, letting teams of teachers try to create newly chartered schools that meet the needs of children and take help from these design teams that include the defense contractors and universities and others who think they have better ways to organize schools to meet the needs of children. We call these New American Schools and we believe that would help them, more than 700 people trying to do that.

So our answer is yes, all could be scientists, and we want to invest more money. It's the President's top budget priority, education. And math and science spending has gone up 130 percent over four years, while the Federal budget has gone up 25 percent. But secondly, we believe we've got to change the system—new schools, teacher flexibility, choice for families, in addition to the standards that we're talking about.

Mr. HAYES. Do any other members of the panel care to comment on this question of access? When you spend $10,000 a year on a kid that goes to school in the suburbs, versus less than five on one that goes to the inner city, it bothers me a little bit.

Mr. ALEXANDER. Mr. Hayes, in the town where I grew up, they spend $3,500 a year and they have the highest academic achievement scores in the State. It's not just money, not just money. They're spending enough money in Chicago to have had computers 20 years ago in their schools. It's how they're spending the money they have. So we have to give people the authority to turn the system upside down, recognize that children can all learn, and then pour the money in. That will attract the money. If we're going to the moon, we can attract the money to go to the moon. If we're helping inner city kids to be first in the world in math and science, we can attract the money to do that.

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[1] So we believe that giving parents the ability and funds to choose a school for their child would help draw the middle- and low-income parents into schools that really meet their needs . . .

Mr. HAYES. We could do a better job of tracking the Federal dollars that come into the State.

Mr. ALEXANDER. Yes, sir. And the President is prepared to put millions—he has recommended a half billion new Federal dollars to go to middle and low income families to follow their children to the schools that serve them the best. That's new Federal money, a lot of Federal money.

Mr. HAYES. Thank you very much. I understand you have to leave.

Chairman BROWN. Thank you, Mr. Hayes.

Mr. HAYES. Thank you, Mr. Chairman.

Chairman BROWN. On the Republican side, I don't know who's been recognized. Is Mr. Boehlert next?

Mr. BOEHLERT. Thank you, Mr. Chairman.

Chairman BROWN. Only if you don't bring up the space station. [Laughter.]

Mr. BOEHLERT. I have no problem with the space station. And I won't bring up the superconducting supercollider, either, which I think is a massive boondoggle. [Laughter.]

I came to this hearing this morning really enthused and excited, because we've got four very able people with very special responsibilities. It's the first time the four of you have appeared in one forum before the Congress that I know of. So I couldn't be happier.

But I must admit I'm frustrated as hell, because all the talk is from this end and we should be asking you pointed questions and getting your observations. I didn't come here to hear all my colleagues give their pet theories. I came here to hear from some of the experts.

Now let me ask you some pointed questions.

Chairman BROWN. Set a good example.

Mr. BOEHLERT. Would all of you agree—and I hope you would agree—that in the classroom, the most important ingredient, it seems to me, is the teacher. Obviously the student is the focus of all attention, but the teacher is the most important ingredient, not the physical plant or all the other amenities. Having said that, I am concerned by reports that I hear that in the U.S. school system, our public school system, in the elementary level, that more than 50 percent of the teachers teaching science, particularly, are not certified to teach science. They may have been history majors or French majors or whatever.

Mr. Secretary—and I know you have to run—could you address that one point particularly? And I have one other question for you before you run, and then I'll get to the others.

Mr. ALEXANDER. Yes. I have a National Radio conference call to be on at five till 12:00, so I'll give you a short answer.

If the question is whether teachers are prepared to teach science today, and math, the answer is no. And the reason is because math standards today are new and dramatically different than they were even ten or fifteen years ago. What we need to know about science to work in an automobile plant or to get any other job is more than ten or fifteen years ago, and that is why the focus of the FCCSET program, the $2.1 billion Federal dollars is refocused on teacher retraining; that is why the President has asked for governors' academies for teachers of math and science.

The answer to the question is no, and that we should have massive teacher retraining during the 1990s as a precondition to reaching the first goals. In almost every school I go to, I find it beginning to go on.

Mr. BOEHLERT. All right. I understand you have to leave now, so I'll be talking to——

Mr. ALEXANDER. Mr. Chairman, I don't mean to be rude. I would stay a little longer——

Chairman BROWN. I'm going to insist, Mr. Secretary, that you take your departure now. We want you back again, and we don't want you to feel that we're going to keep——

Mr. RITTER. Yeah, you can come back after you make your phone call.

Chairman BROWN. We want to thank you very much for being here.

Mr. ALEXANDER. I would like to come again, Mr. Chairman, and I congratulate you for bringing the two committees together. Thank you.

Chairman BROWN. You're very welcome.

Mr. BOEHLERT. Dr. Bromley, we've talked about this—and I will get back to Secretary Alexander's staff on this subject. But I agree that the teacher is the most important ingredient and I agree we have to attract the best and the brightest to the classrooms. And I applaud the administration's initiative with the Eisenhower scholarships. But that doesn't necessarily guarantee that the recipients will end up in the classroom.

We have the Noyes scholarships, an initiative by Senator Rockefeller and myself, to provide $5,000 stipends in the junior and senior year for math, engineering, and science students who agree to teach two years for every year of the stipend. That's hopefully an approach to get the best and the brightest in the classroom. Because, quite frankly, Mr. Secretary and Dr. Bromley, to get a kid—well, today's market is not the best indicator—but a bright, young student graduating with a math and science discipline degree and the local school offers maybe $17,000 to start, and General Electric down the street offers $35,000, where do they go? They don't go to the schoolroom. They go to corporate America.

So why aren't we funding that program? It's authorized, it's ready to go. Dr. Bromley, give me some encouragement.

Dr. BROMLEY. Well, I would have to say, Mr. Boehlert, that the idea is an attractive one, as part of an overall program. I don't think we want to do all of our efforts towards inducing young people to take up teaching as a career through this approach, but it is one approach among a number that I think merits careful attention.

As you know, when we've discussed this in past hearings, I've indicated my personal support for it. It's still there. I think it's a good idea. I will certainly work to see if we can't do something about it.

Mr. BOEHLERT. Within the FCCSET community you will encourage Dr. Massey and Admiral Truly and Secretary Alexander——

Dr. BROMLEY. It clearly is something we will discuss within the FCCSET community, yes.

Mr. RITTER. Will the gentleman yield on that point, just for a very brief comment?

Mr. BOEHLERT. Sure.

Mr. RITTER. If the school system pays $17-, and if General Electric pays $35-, then obviously there is a market mismatch for the skill and obviously the market must adapt, and lock-step teacher reward systems that are based only on seniority and not on what the market is saying about a skill is what's causing this problem. No amount of Federal tinkering is going to change it.

I was a part of America 2000. I think we're going to see some very interesting experiments out there which bring the marketplace back towards rewarding teachers, not just bureaucratic merit reviews, but merit and market—M&M. It's like the candy. It's really quite an American thing.

Mr. BOEHLERT. I thank my colleague for his observations.

We entrust our most precious asset, our future, our kids, in the hands of teachers, and yet we don't treat educators very well in America. That is my opinion. He may not share that. We undercompensate them, we have them doing everything but educating. We make them disciplinarians when we don't want to do it at home. We make them hall monitors and all the other things. I think we've got to do a better job of compensating educators and putting them back on a pedestal where they belong.

Having said all of the above, Dr. Bromley particularly, maybe some of the others might have a comment—and I think Secretary Alexander would be the best one—do you have any feel for how the Rochester experiment is working in Rochester, NY? You know, that system under which they have master teachers in the public education system, that can earn as high as $75,000 at the peak. How is that working? It's relatively new.

Dr. BROMLEY. It's relatively new, and although I spent six wonderful years in Rochester, I have not kept in close touch with the program so I cannot answer from personal experience or personal contact. I will tell you, however, that the second order rumors that have filtered back to me from the program suggest that it's working remarkably well, that this mentoring approach, where master teachers work with other teachers to spread unusual capability and competence in teaching, is, in fact, working, and is considered to be a success by the people in the Rochester school board that have been involved in setting it up.

So I think it's an excellent pilot program, it's one that we are clearly watching, and it's one that I think is already being copied in other cities across the country.

Mr. BOEHLERT. It just concerns me. We try to attract the best and the brightest in the classroom, then we give educators nothing but grief, and very little recognition, and very little compensation.

Dr. BROMLEY. One of the things that was most evident in the Educational Testing Service international comparison that was issued a few weeks ago was the dramatic comparison between the duties of teachers in the other countries surveyed and in the United States. In the other countries surveyed, it was very clear that the teacher had one responsibility and one responsibility only; namely, to be extremely expert in the field in which they taught, and to teach that subject. They were not expected to take care of

discipline, to take care of anything other than teaching their subject in the best possible way.

We, unhappily, as a number of your colleagues and yourself have stated here, have unloaded on to our schools a whole series of responsibilities that in the years past were the responsibility of the family, of the church, of the community, and in doing so, we have made life extraordinarily difficult for our teachers. We ask almost impossible things of them at the present time. That's part of what Secretary Alexander had in mind when he said we have to turn the whole system upside down.

Mr. BOEHLERT. I agree.

Dr. Massey, let me ask you—one further one. I've been waiting a long time, Mr. Chairman.

Chairman BROWN. So have several other people.

Mr. BOEHLERT. Are they here? Where are they?

I just want to ask about elementary school levels. I think it's a national objective that our young people be computer literate by some date certain, maybe sixth grade, ideally, or eighth grade.

Where do we find the funding to get the computers in the classrooms at the elementary level?

Dr. MASSEY. Well, we at the Foundation, as part of our education programs, have programs—about $15 million or so; it's not on the national scale perhaps, enough to fund computers in the schools.

But I agree with Dr. Bromley earlier. I'm not convinced, I guess, that the obstacle to putting computers in most schools now is financial. The price of computers has just dropped dramatically. I think maybe school systems don't give them high enough priority. But the biggest, I think, disincentive is the teachers are really not prepared to make maximum use of them, and that's what we have to work on. It's back to your point. We have to focus on reeducating those teachers who are in the system now, who unfortunately did not have the adequate training when they went through the first time.

Chairman BROWN. Mr. Andrews.

Mr. ANDREWS. Thank you, Mr. Chairman.

I wish Secretary Alexander were still here, but I would ask the three of you that remain to put on your generalist hats and describe for me how you would address this problem.

Let us take the son or daughter of a family with a $45,000 family income, who is the brightest physics student in her high school senior class. She is able to get into MIT and study physics at MIT, and she would like to be a teacher. She would like to study physics at MIT and go teach in a junior high school or high school around the country.

The way our financial aid system is set up today, if she is able to get to MIT, she's not going to get there via a Pell grant because if she makes more than $12,000 a year she doesn't get one of them, and frankly, the administration would say, if her family makes more than $10,000 a year, she doesn't get one of them. She then has to go through the student loan program, which means she probably graduates from school with a debt of $30-, $40-, $50,000 the day she walks out the front door.

Why is that young woman going to choose to go teach at a public school with a starting salary of $23, $24,000 a year, sometimes

lower around the country, when she could go to work for General Electric or Westinghouse or someone else at twice the money? And what are we doing about that?

Dr. BROMLEY. Perhaps if you'd permit me, as a 30-year veteran of the Yale faculty, I would perhaps suggest that she should decide to study physics at Yale, because, under those circumstances——

Mr. ANDREWS. No, she wants to be successful. She wouldn't want to do that. [Laughter.]

Dr. BROMLEY. That's a low blow.

Mr. ANDREWS. My friend, Dick Swett, left. He would disagree with that as a Yale graduate.

Dr. BROMLEY. Let me continue, if I might.

The fact is that not only Yale but also MIT, a great many other universities, are prepared and, as a matter of course, have need-blind admission. Students are admitted on the basis of their ability, and whatever level of financial support they have from their families or from any other source, the university commits to make up the difference so that outstanding students of the kind you just described have access to those schools and to the complete undergraduate program.

Mr. ANDREWS. Maybe my example is an inept one. What if she wants to go to Drew University in New Jersey, who's endowment is probably two percent the size of that of Yale, and does not have the institutional resources to do what Yale or MIT could do?

Dr. BROMLEY. If she's one of the brightest physics students, why would she do that?

Mr. ANDREWS. Because when I say one of the brightest—let's say she's in the top five percent of physics students around the country, so maybe she doesn't get into Yale or MIT but she gets into a very high quality institution.

The point that I'm driving at here is that it's very nice for us to set up demonstration projects for improving science teaching, but the economic structure, given our financial aid plan, is that if you want to go to school, get a science education and teach science, you have to do so at a considerable financial sacrifice, because the only way you're going to get to school is to borrow money. We have a loan program that says, once you borrow, you're going to have a large debt when you graduate, and teachers' salaries have not caught up with that. We can do all the demonstrations that we want, but it seems to me we had better make it affordable for somebody to make an intelligent choice to say "I'm going to be a science teacher," and we're not going to punish someone for doing that.

I would suggest that the principal answerer of the question, Secretary Alexander, maybe should rethink the administration's opposition to income-contingent student loans. Maybe the answer to my hypothetical young woman is that she takes a job for $24,000 a year, she can pay back her student loan at three percent of her gross income for 25 years, instead of making a payment she can't afford for ten. I mean, these two things are connected. It's very nice to say you support science education on the one hand, but you had better support financial aid for people to become science teachers on the other. I hope they will all be working for your agency some day.

Thank you.

Chairman BROWN. Thank you.

I'm going to recognize Mr. Ritter, who has also been very patient. I will have to tell you that this quorum call will be followed by a few minutes debate and then a series of votes. I do not want to impose further upon either the witnesses or the committees under these circumstances. So we will adjourn as soon as Mr. Ritter is through.

Mr. RITTER. Thanks, Mr. Chairman.

First of all, I really want to commend our witnesses for an excellent job. I want to commend Dr. Bromley for pulling together this FCCSET process.

FCCSET was around before and it was "broken". I think—[Laughter.]

I think Dr. Bromley deserves a great deal of credit for putting it back together again and coordinating these incredible resources that exist at the Federal level, these multi-billion dollar resources. It is not just in education but it's in a host of other areas, where all of a sudden different science, engineering and technology functions of this vast Federal research, development, science and engineering and technology economy are talking to each other. I really cannot underestimate the job, Dr. Bromley, that you have done for all of us.

Now, I just want to make a comment on Mr. Andrews' last statement. It's similar to the comment I made on Mr. Boehlert's statement. Yeah, coming out and teaching science in a public school is not economically functional, unless you're just so dedicated that you're going to do it no matter what. So we're going to have to rethink the way we reward science, mathematics, other disciplines out there, where the marketplace is saying something and nobody's listening.

Again, I hope to see out of America 2000—and I know there are staffers here from the Department of Education—innovative experiments, whereby we do fund the idea of master teachers, or perhaps science and mathematics fast-tracks to bring people into that pipeline, so that they will study it and then, when they come out, there is some reward for going into teaching. That's the way America works. We are not Czechoslovakia. They're trying to do what we're doing, and to some extent, in certain portions of the economy, we have moved with almost a socialistic reward system.

I'm not trying to knock the community of teachers, the unions or what have you. This is the way the system has evolved. It does need, at the margin, some changes. I think you see Albert Shanker, the President of the AFT, talking about these things. Okay.

I want to ask a specific question of you, Dr. Bromley. It relates to some of the work that Admiral Watkins has done on CEHR; it relates to technology in the educational environment and the upcoming conference on technology. It seems to me that we are at a critical point in history where the technology in computers, the software, the telecommunications delivery systems, the digital compression getting more into a copper wire to be able to do interactive experiments and activities in our classrooms—again, so much software on the shelf. It's a real ripe time to somehow coordinate it, integrate it, put it together. FCCSET seems like a great place to

do it because some of the customers for these kind of systems might well be Federal agency customers, so you could populate, man the lines and make the system begin to pay for itself—the DODs, the NASAs, the NSFs and also other Government bureaucracies and organizations, the Justice Department, what have you, in any event, for their education and their training.

Where do we stand here on these community learning networks that try to integrate all of the above, and then bringing the chambers to somehow bring the industrial and private sector and business world into the picture?

Dr. BROMLEY. Two parts to the answer, Mr. Ritter.

First of all, as part of the President's high performance computing and communications initiative, one major component of the National Education and Research Network has, as part of the mission, the development of the kind of hook-up that you're talking about. That will be done on an experimental basis in that network, with the hope that the technology, the protocols, the knowhow that we develop there, can connect——

Mr. RITTER. The connectivity between the different systems.

Dr. BROMLEY. Yes.

Mr. RITTER. The human access to all these wonderful things, the access between teachers and technical types, right——

Dr. BROMLEY. Yes.

Mr. RITTER [continuing]. To make this——

Dr. BROMLEY. That's precisely what we're hoping to do.

Mr. RITTER [continuing]. Available in real time as opposed to theory.

Dr. BROMLEY. That's precisely what we're trying to do, to establish specific demonstration projects as fast as we can, that can then move out into the general information utility that I hope is going to be well underway by the end of this decade. But a much more encouraging thing has to do with the private sector initiative purely on its own.

I recently had the privilege of speaking at the first commencement of the National Technological University. That university has no campus, none at all. It operates out of a center somewhere in Colorado, and it has students at major industrial factories and locations around the country. These students are given time by their employers to listen to some of the Nation's foremost lecturers.

Mr. RITTER. This is the system that connects the MITs, the Yales, the Lehighs with the——

Dr. BROMLEY. But this is different. This connects the Xeroxes, the IBMs, the GEs, the AT&Ts——

Mr. RITTER. With each other?

Dr. BROMLEY. With each other, and with a central node, so that very outstanding lecturers, like Edwin Mansfield from the University of Pennsylvania, for example, is the person who teaches economics to this group. I had the privilege of speaking to the first graduating class——

Mr. RITTER. Do they do that from the University of Pennsylvania?

Dr. BROMLEY. Yes, yes.

Mr. RITTER. Connecting these universities to an—

Dr. BROMLEY. Up and downlinking from each university. They're all connected, the industrial centers, the universities where the faculty are located, and they are connected interactively so that the students can interact with the faculty member as though they were sitting in a classroom with him or her.

Mr. RITTER. I think, Mr. Chairman, I think this is a remarkable piece of good news in our desire to make America 2000 a reality. We have some historic convergence of forces here and factors that, with leadership—and here again, it really is a potential leadership for a group like FCCSET, for the Federal Government, working with the private sector. We can accelerate this science and math knowledge acquisition, be it for our teachers or for our students. There's just tremendous potential out there. And I want to commend you, Dr. Bromley, and some of the people like Dick Truly and the NSF, for really starting to put these pieces together, so that the whole becomes infinitely greater than the sum of the respective parts.

Thank you, Mr. Chairman.

Chairman BROWN. Mr. Sawyer has already been over and voted, so I'm going to give him an opportunity to——

Mr. SAWYER. Thank you, Mr. Chairman.

I want to begin by expressing my gratitude to the bipartisan leadership of both of these committees for bringing us together today to hear this distinguished panel. It is an important step in that broader mission that we have to more lightly focus the collaboration between our committees on math and science programming.

Dr. Massey, your comments about that kind of collaborative efforts among the agencies represented at that table are a mirror of the kind of work that we need to do here.

Mr. Truly, I couldn't help, when you were talking about the space station, thinking back to the spring of 1957. In my sixth grade Miss Barber's science class—it's just indelibly burned into my mind—she had asked us a seemingly straight-forward question on a multiple choice science test. She was doing the best she could. She was a lovely lady. She wasn't a science teacher. The question that was on the test was, "If man goes into space some day", which gives you some idea, I guess—well, I said 1957, didn't I? "If man goes into space some day, he would need a space suit because..." and the choices were these: "extreme heat, extreme cold, a great distance from Earth, and none of the above." I made the mistake of answering "none of the above," and when it was marked wrong, asking why. I mean, that was a terrible mistake.

Miss Barber, a wonderful person, kindly asked me to turn to page 76, or whatever it was, in my textbook, where there was some fact from which she deduced the following reasoning . . . "If man goes into space some day, he will have to wear a space suit; otherwise, his blood would boil."

Now, it was one of those moments when you came to realize that your science teacher really was a nice person. [Laughter.]

Chairman BROWN. You just made that story up.

Mr. SAWYER. No, I didn't. It's the absolute truth. [Laughter.]

It's the absolute truth.

Let me tell you another story that happened just a few weeks ago, a close associate in this chamber was reading a speech, and the speech went something like this: that when he was a boy, that he looked up—actually, this is not true; this I am making up. This was a speech that was written for me by a staff member whose judgment I trust greatly. But she had written this beautiful image about when I was a boy, I looked up in the sky and had seen nothing but chaos. The stars were beautiful, but it just made no sense, and that as I grew older I learned about the constellations, and in seeing this order it made sense, and the beauty of that order was the sort of thing we were trying to bring to science.

I was talking to a group of science teachers, and I couldn't help but say, you know, it's absolutely wrong to presume that that order in any way reflects that universe, that, in fact, the chaos that I had perceived at first may have been the more accurate perception of the cosmos. I couldn't help but think that, as Secretary Alexander was talking about the performance of those nine and ten year olds, whose ability to make connections among understandings is really at the heart of scientific imagination. It's something that we ought to find a way to nurture and to build upon. In that sense, what we're doing here is every bit as important, as everybody here has spoken of.

I just want to touch on a couple of things. When I look at the Eisenhower state grant program and how just a few years ago, many people saw it as a kind of moribund program, one that was underfunded, didn't have enough dollars to do the job it needed to do, the dollars were distributed in an unfocused way, and the distribution formula was beset by a complexity that made it difficult to work with. As a result of the work of this committee, we have been able to focus those dollars and to drive them to localities with incentives to work in consortia and with higher education and with the private sector. In many places it's doing an enormous amount of good.

I had heard a few weeks ago—one of the Assistant Secretaries,—I guess it was reported in Education Week—talking to a group of Texas educators, to the effect that there was one plan that would take some 90 percent of those state grant dollars and draw them back into a competitive grants program controlled by the Secretary. That gives me great pause because, while there may be the need for that kind of program, the ability to drive those dollars out where they can do good at the local school district level, with the greatest flexibility, really represents the kind of experimentation in real world teaching that I think serves best the interest of a terribly diverse country.

I'm sorry the Secretary of Education isn't here because it really is his question. But can any of you comment on how we should be distributing math and science dollars? How do we get the most from the limited funding that is now available to us?

I can tell you this. When we get into fights over whether or not we're going to have education or space stations, or the more frequent one, whether we're going to have housing or space stations, it seems to me that we're posing inappropriate questions in tension with one another.

Too long a speech, but we do have time.

Chairman BROWN. Mr. Truly, do you want to respond to that?

Admiral TRULY. Mr. Sawyer, if I might just make one—two comments. First, on your last one, I do think that the debate about specific programs like space station versus whatever argument is at the hearing is somewhat inappropriate, is an inappropriate way to make our decisions, and thank goodness that they aren't made that way, because in the final analysis, the full Congress votes, and on space station there is a good example of where many inputs came up with one decision in order to continue it on schedule.

The point that I did want to make, though, is you asked about competitive processes, and I won't comment on those broad grants that NASA does not have a specific responsibility in. But there are many cases where the best favor that I believe that we can do without precious program dollars are in competitive situations. As long as we have a clearly fair and deliberative process, that can be examined by the Congress or others in order to apply those funds—and let me give you an example.

We have recently had a large increase, percentage increase, in the NASA budget over the last three years for education, larger than the total NASA increase, larger than for space station, larger than for some other projects. Of that increase, a large portion of that has gone to minorities, to helping minority universities, people with disabilities, women in science. And a specific one has been a recent set of research grants that we made available to the historically black communities and universities.

But the money was so precious that, frankly, there is a critical mass—in other words, to have enough money to give a grant to a university that can really make a difference and really attract minorities into those colleges and make a difference. About a couple of months ago—and we competed that among the HBCU's. We are awarding this year for the first time seven grants, to the seven successful HBCU's that won them. I had the presidents of those HBCU's in to talk with them about it.

I think it's a situation where—and it will provide them adequate money to have a research program in their university that can truly make a difference, hire the teachers, get the equipment, attract the people, and also use role models to bring those kids along and to increase the number of black engineers that will become available. So I think there is a strong case to maintain quality in what we do with our precious dollars, and in some cases that does drive us to competitive situations that in the end, and over the period of this decade, when our goals are to be achieved, I hope, that is the way to go.

Thank you, Mr. Chairman.

Mr. SAWYER. Thank you all.

Just as a follow-up comment, I wouldn't disagree. Competitive dollars for demonstration programs, that give a chance for excellence to flower, is enormously important. I'm just concerned that you wouldn't want to do that at the expense of NASA's operating dollars, the groundwork with which you operate.

Let me just give you an example of what was done in my district with some Eisenhower state grants. In addition to increasing the amount of money that went out in terms of minimum grants, districts were encouraged to come together in consortia. School dis-

tricts were encouraged to come together in consortia, to pool their dollars, and then to go and combine them with State higher education money.

In my district, six districts came together, took their Eisenhower state money, put it together, attracted a State higher education grant in a competitive fashion, with a nearby university, and went to work with—not specifically for the teaching of children in those six districts, but to do experimental work in the teaching of mathematics in conjunction with the school of education and the department of mathematics at that university. And together, with a program that totaled close to a quarter of a million dollars by this point, attracted a similar amount from a major corporate contributor.

That half a million dollars was something that those six districts, in conjunction with that university, could make real use of. I don't think they could have done it except for the availability of Eisenhower state grant funds and the flexibility that the current program provides. I would hate to see that lost.

But I have to agree with you completely, that if we cannot elevate those programs of excellence, hold them out as models all across the country, then the 15,000 to 16,000 school districts that make up the United States will not have the guidance that they need.

I thank you very much for your patience today, Mr. Chairman.

Chairman BROWN. Thank you for yours.

Gentlemen, you have also been extremely patient. This has been sort of a "good news/bad news" hearing. The good news is that I've never seen so many people interested in math and science education; the bad news is we couldn't provide enough time for all of them to make their speeches, or ask their questions, as the case may be.

We're grateful to you and we hope we don't have to call you back together like this again soon. The hearing will be adjourned.

Dr. BROMLEY. Thank you, Mr. Chairman.

[Whereupon, at 12:30 p.m., the committees adjourned.]

APPENDIX

UNITED STATES DEPARTMENT OF EDUCATION

THE SECRETARY

April 9, 1992

Honorable George E. Brown
Chairman, Committee on Science,
Space, and Technology
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

As a witness at the joint hearing before the Committees on Education and Labor and on Science, Space, and Technology, I have edited and am returning the hearing transcript forwarded to me for review. I would also like to request that the following information be included in the hearing record:

Page	Line(s)	Proposed Wording
31	637-639	, and to spend 25 million more dollars to help move along the idea of world class standards, curriculum frameworks, and assessments tied to these standards and frameworks.
74	1657-1658	So we believe that giving parents the ability and funds to choose a school for their child would help draw the middle- and low-income parents into schools that really meet their needs...

I understand that this letter may be inserted in the transcript in the form of an appendix and referred to by footnote in the main text.

Sincerely,

Lamar Alexander

Lamar Alexander

Enclosure

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